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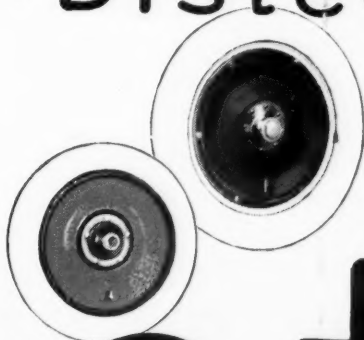
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AUTOMOTIVE INDUSTRIES

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VOL. XLVIII

NEW YORK—THURSDAY, MARCH 29, 1923

No. 13

Take Alibi Out of Production and Bring Down Costs

Make mechanical arrangement conform to existing human needs. Settle increased responsibility on foremen and train them so they are capable of accepting it. Reduce overhead account to a unit cost basis. Possibilities shown by actual experiences.

By Louis Ruthenburg

ONE of our older written records tells of a certain Adam who lived with a woman named Eve in the Garden of Eden. There is an episode having to do with the eating of a forbidden fruit by these two. It is recorded that when Adam was called upon to testify concerning his part in the misdemeanor he said, "The woman, she tempted me." This is an early record of the well-known tendency of the human animal to "pass the buck"—to evade responsibility. If it were possible to compute the waste and lost motion which has, since the time of Adam, resulted from this single human tendency, the result would probably be startling even when compared with the findings of the Hoover Committee on the Elimination of Waste in Industry.

An important problem of modern industrial organization is eliminating the alibi—of so arranging the mechanics of production, of so instructing people that responsibilities are more completely assumed and more effectively discharged.

We are relatively proficient in handling the purely technical or mechanical phases of our production problems. The reduction of mechanical waste and lost motion has, particularly in the automotive field, been carried on with remarkable effectiveness.

Probably because the problem is a less tangible one,

because of the vast number of uncertainly defined variables involved, we have not made similar progress in handling the human phases of our production problems. The reduction of human waste and lost motion has been greatly neglected and in this field there are remarkable opportunities for accomplishment.

WE shall be a long time in reaching a point at which we can work out such problems on a slide rule. Indefinite factors are involved and the production man, pressed always for better quality at lower cost, has little patience with fine drawn psychological theory. Consequently, this article will be largely confined to a record of certain simple methods which have accomplished a measurable saving of human lost motion.

I do believe that we shall some day come to regard our broader technical accomplishment—our mechanical progress—as a matter of secondary importance to our understanding and handling of human problems. We are now in the habit of thinking of the latter problems as incidental, to our more tangible production problems. A very little analytical thought will convince one that in an organization where the human equation is dealt with as of first importance,

and where human questions are well solved, such matters as low cost and high quality of product do very naturally result as *by-products* of the successful handling of human problems.

Future progress may depend upon how well we solve the problem of reconciling the mechanical phases of industrial progress with the habits, instincts and tendencies of human beings. In fact, some of our more intense and dramatic thinkers do not say "it is possible" and "perhaps." They say "we *must* or we *bust*."

THERE are two obvious ways by which reconciliation may be accomplished. First, we may plan our technique; we may make the mechanics of our work conform with existent human requirements. Second, we may, by constructive education, change human points of view to a better perspective of changing conditions. H. G. Wells dramatizes the necessity for this latter, when he describes present civilization as "a race between education and catastrophe."

Some years ago a company with which I was connected had occasion to make some rather intensive plant studies with the object of reducing costs. It was discovered that certain moulded insulation parts were the source of serious delays and great waste.

One particularly delicate and complicated part involved a total scrappage of about 50 per cent. It was the custom to mould the parts in a press department after which they were carried to a buffing department to have the flash removed. From this point they moved from one department to another for the various operations necessary for completion—drilling and tapping in one department, milling in another, assembling and soldering in still another. Finally they were taken to a finished stock room from which they eventually found their way to a packing and shipping department.

As a result of this and subsequent investigations, these moulded parts came to be completed within the press-moulding department, which had originally performed only the initial operation. The few machine tools, fixtures and benches actually used for operations on moulded parts were set in the moulding department and all operations to complete parts and assemblies, ready for shipment, were performed within the one department.

The total scrappage on the particularly delicate and complicated part previously referred to dropped to well under 5 per cent almost immediately. Delays were eliminated. Inventories of work in process were greatly reduced, machine tool loading was greatly improved, all expense items chargeable to the production of moulded insulation parts became smaller. In short, we had achieved the objective of greatly reduced cost with a notably improved product.

The same process was applied with like results to a great many of the products of this particular plant. It has been equally successful in many other shops. It is

a simple mechanical rearrangement with definite, measurable, physical results. Definite procedure was developed for making surveys and projecting results of new layouts. Rather remarkable and quickly apparent improvements were possible in many shops which, like Topsy, had "just grown."

But far more important than any of the desirable physical objects accomplished, *we had eliminated the alibi*. We had fixed responsibility. By a rather obvious mechanical rearrangement we had accomplished an important psychological readjustment on the part of our foremen. When responsibility was divided among half a dozen foremen and they were all at liberty to "pass the buck" to the trucking department scrappage of 50 per cent resulted. Then we set up a condition under which we looked to one foreman instead of to many. Each one hadn't a chance to "pass the buck" and he knew it. Therefore he assumed the responsibility and delivered the goods. We had here a human reaction to a mechanical expedient which seemed so interesting and important as to almost eclipse the very important and profitable physical results of the change.

We were consequently led into a broader consideration of that very interesting subject, "Eliminating the Alibi from Production."

Approached from this point of view, it became apparent that in applying functionalized management and staff control we had for years, under the slogan of "efficiency," been making it the very obvious thing for a departmental foreman to evade responsibility. An Employment Department hired and fired the men under his supervision. A Rate Department established their wage standards. A

Tool Division planned the processing of parts and devised the tools and they were issued to the men by a Tool Supply Department. Stock was delivered to his department and taken from it by a stock or Dispatching Department. An Inspection Department passed judgment upon the quality of his work. A Power and Maintenance Department swept the floors, mended the belts and shifted the machinery. None of these functions were under the supervision of the departmental foreman and each of them became an alibi, actual or potential, thoughtfully supplied by the management.

If one were deliberately to attempt to set up a combination of human beings among whom it would be difficult to fix responsibility he could have no better pattern than the modern manufacturing shop under functionalized management.

WHAT can be done about it? Aside from such mechanical rearrangement as that described earlier, we soon realized a necessity for rather definite training; for establishing a fresh point of view in the matter of foreman responsibility.

In one of our informal foremen meetings the question was proposed—"What is a foreman in this shop and what is he supposed to do?" It is not surprising, in

"PASSING THE BUCK" is a favorite indoor sport in almost every production organization. It is the cause of much industrial inefficiency and its elimination means considerably lowered manufacturing costs.

This article outlines the practical means used by an important production man to get rid of the alibi in his shop organization. His efforts were largely successful. He relates his experiences in detail.

The troubles that he encountered will be recognized by factory men all over the industry as present more or less in their own plants. His remedies for those troubles have an equally widespread application.

Ruthenburg tells a practical, useful story, full of specific examples, based upon a comprehensive experience and indicating a constructive vision of future production possibilities.

view of what has been said, that the answers were hazy. Then this proposition was placed before them:

"The management has no more definite idea than you about the present status or responsibility of a foreman in this shop. It does have, however, a very definite idea as to his *future* status and responsibility. Every departmental foreman will be regarded as the general manager of his department. He will be held fully responsible for everything that happens or fails to happen in his department.

"A very low order of executive ability can obtain some kind of results from people over whom the hope of reward and the fear of punishment is held. A very much higher type of ability is required to obtain good results from people who are coordinate with or superior to yourselves. Such ability you must learn to exercise.

"Let us consider tools, for example. Why is it that some of you men always seem to have tools delivered as you need them by a tool division over which you have no direct authority and that you never use the tool room's failure as your alibi, while others never seem to obtain the tools they need? In fact, they have standardized this particular alibi.

"In the future you will regard the function of such departments as one of service to you. See to it that they serve you. They are not to be used as alibis. If you can't persuade them to serve you well, you are responsible. Reasons are things you state to your superior in time for correction, before failure. Excuses are reasons gone to seed. As general managers of your departments we look to you for results—not excuses."

This creed was expanded and kept before the department foremen and the organization generally in many forms. It seemed absolutely essential to get as far away as might be possible from the "buck-passing" opportunities of modern industrial organization.

So far we had observed the effect of physical rearrangement in fixing responsibility. We had achieved a realization of the great importance of eliminating the alibi among our departmental foremen. We knew that modern shop organization made it difficult to fix responsibility and we had grasped the necessity of holding our departmental foremen fully responsible as general managers of their departments.

All of which summed up as little more than very pretty theory. It was all very well to enunciate to the foremen *the management's notion of their responsibility*. It was quite another matter to make them mentally fit to assume a responsibility so broad.

Foreman Training

THIS brought us face to face with the problem of foreman training. We were not so much interested in the injection of information as we were in somehow inspiring our foremen with a new vision of their jobs and a desire to learn those things which would help them fulfill that vision. We passed up all these attractively arranged, magnetically sold panaceas. *It seemed to us that the mechanism of the thing—text-matter and arrangement—projects and quiz questions—was of much less importance than the spirit in which the training course was approached by the men to be trained.*

We sensed the futility of doing the usual thing—of hastily calling the foremen together without warning or preparation, and telling them in a more or less patronizing way that "the company proposes to expose you to a course in foremanship, which is a perfectly fine thing because it has been prepared by—let me see—oh, yes—Mr. So and So, whom you all know by reputation as the man who did this and that. And now, boys, I'll have to run along, but Mr. Blank of the Personnel Department will handle the proposition and the management is for you and feels sure that when you have com-

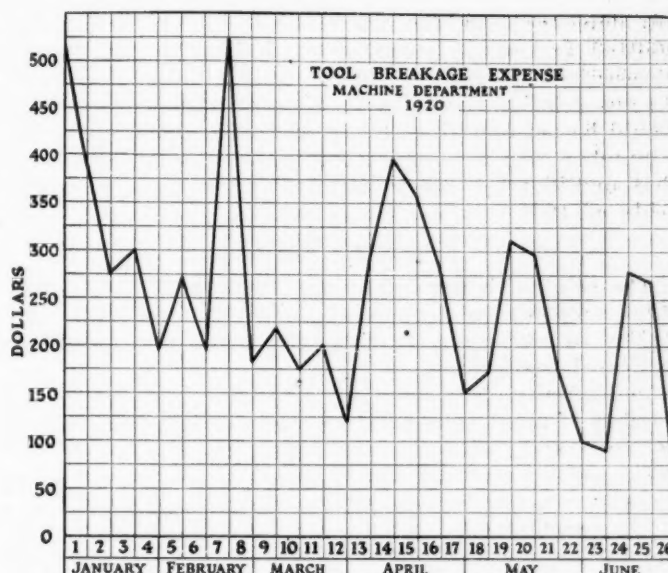


Chart showing decrease in tool breakage expense

pleted the course we will have less scrap and that our costs will be reduced."

It was done just about that way in many cases and in those places they'll tell you today that foreman training doesn't amount to much. They know. Haven't they tried it?

It is to laugh. Here's old Bill Jones who has been running the turret lathe department for five years. Without warning or preparation the boss says to Bill. "Bill, we're going to give you a chance to learn foremanship. Look, here it is in a book written by Professor Hibrow." Inasmuch as the speaker is his boss, Bill may not reach for a wrench. But there is no doubt that he thinks the boss is off his nut. Where does he get that stuff? Teach him foremanship, huh? Why, hasn't he been holding down a foreman's job for years? And he'd like to see the bird that can tell him anything about turret lathes!

Certainly Bill sits in on the classes. You have to put up with a lot of damfoolishness in this shop, anyhow, to keep from getting in wrong, and as long as the rest of the bunch stands for it why should he pass up a good job? But learn anything? Say, don't make him laugh. You don't learn how to be a foreman out of a book. What do these white collar birds know about making a bunch of bums get production out of a string of B. & O.'s, anyhow?

With such a lack of receptiveness on the part of the men to be trained it is not remarkable that the result of "foreman training" in many instances left much to be desired.

The more obvious causes of unsatisfactory results in foreman training are:

1. Poor preparation of the men. An attitude of passive resistance existed where one of enthusiastic receptiveness was necessary.
2. Failure of the usual course to fix fundamental principles by means of illustrations drawn from concrete practice with which the foreman is in intimate contact.

Long before any steps were taken toward the actual preparation of text material we sent to our foreman a note in which we said that we did not know exactly what qualifications were necessary in a successful foreman in our shop. Nor did we know the relative importance of the various qualifications. In order to get into the matter we were sending a tentative list of qualifications which seemed important. Would he add to our list

any important qualification which in his opinion we had omitted and strike out any which he regarded as unnecessary? Would he please explain fully his reason for any deletion or addition? With so much accomplished would he set opposite each qualification in his final list a number which would indicate the relative value of that qualification (according to his opinion) in a total scale of 100?

Foreman Rating

The original bogey list of qualifications included such characteristics as leadership, ability to develop men, ability to cooperate, in addition to technical ability as previously defined.

Incidentally, the same memorandum was sent to a number of plant managers, vocational educators, personnel men and, with the assistance of Dr. Walter Dill Scott and his staff, all of the resultant material was reduced to a very effective scheme of foreman rating.

The result among our foremen of studying and replying to this proposition was a realization that perhaps there were more things to this foremanship than "were dreamt of in their philosophy." This was evidenced by frequent requests for advice on reading matter and various study courses.

When a general tendency became apparent among the foremen to see their jobs from a new point of view we set about preparing a course.

A committee was appointed to prepare text material. The writer served as chairman. The employment manager, the educational director and the manufacturing division secretary completed the committee.

As soon as the first text had been prepared the foremen were called together. They were told that we were not certain of what could be accomplished by the sort of course we had in mind. They were asked not to expect too much of it. It was pointed out that whatever good came of the course would come as a result of what they put into it in the way of interest and sincere study rather than what the committee could give them. It was explained that only one initial text had been prepared and that additional texts would be prepared as the class progressed, the nature of future texts to be determined by class requirements.

It was clearly stated that the men were individually free to "take it or leave it"—that their standing with the company would not be changed by a decision to "pass it up." It was proposed that each man would attend one class per week, held half on company time and half upon his own time. Enrollment slips were given all the men in the meeting. They were told to sleep on it and to pass in their slips next day if they felt like coming along. We had something over 100 per cent enrollment. That is, in addition to all our foremen a number of men from other divisions—clerks and accountants—asked permission to enroll.

Attitude Toward Work Improved

This class continued all winter and spring with an average attendance of 83 per cent. The men seemed to acquire a better grasp of the fundamentals of their jobs and displayed a much keener interest in their work.

As it appeared in prospect, so it seems in retrospect important that the men were led to approach the proposition from an experimental point of view. Promises of assured and miraculous results were not given. Furthermore, they felt at all times that the course was largely of their own making. The machinery of the thing was all exposed to them. It was in no sense "ready-made" or "canned." Each of them seemed to have a creative as well as an acquisitive interest in the matter.

By the following fall we were well into the general business depression. The foremen asked permission to organize and conduct their own class. They did this by organizing a series of committees, each charged with presenting a paper for discussion on a stated subject. Every foreman was required to present one paper during the course of the season. Very few of these men had ever written on any subject. None of them had ever spoken at length before a critical audience. The direct and indirect results of this series of lectures and the attendant discussion were most valuable.

The next phase of this educational work among the foremen is now in operation. It may be described briefly as a fairly comprehensive study in general plant management and industrial engineering in the broadest sense. It is largely motivated by the men themselves, the educational department serving only as a steering committee.

So far this foreman training has passed through the following phases:

1. Preparation of Receptive Attitude.
2. Primary Training Course.
3. Cooperative Lectures and Discussions.
4. Industrial Engineering and Business Administration.

Just what future phases may develop is more or less "on the knees of the gods." The thing, once properly started, seems to evolve (with a little steering) in a surprisingly constructive way. Needless to say, we did not foresee the development to date when we instituted the first phases of the work.

Each phase of the training has had a marked effect in taking the alibi out of production; in fitting the foremen to assume their responsibilities more completely and to discharge them more effectively.

Statistical Control in Eliminating the Alibi

Unfortunately, for purposes of shop control, cost accounting methods have been developed largely by general accountants whose primary interest has been the matching of their cost figures with general accounts. Their point of view has, therefore, not been conducive to the development of the most effective running signals for the use of the shop. When the production man receives his figures from the accounting department they are often faulty in two major respects.

1. They are of historical rather than of news value.
2. They are not in such form as to hold foremen accountable for their "overhead" expense.

Fortunately it is not difficult to remedy these defects, given an analytical sense on the part of the shop man and open-mindedness and willingness to cooperate on the part of the accountant.

The habit of throwing all charges which cannot be directly allocated to material or direct labor into a scrap basket called "overhead" is decidedly a pernicious habit. It makes almost impossible efforts to eliminate the alibi from production.

There is a harmful tendency to regard this overhead percentage as a thing of importance within itself whereas it is, within itself, frequently misleading.

At one time one of our accountants came to me "more in pity than in anger" to tell me that the overhead in our screw machine department had increased from 400 per cent to 450 per cent. I told him that I could reduce it to less than 400 per cent overnight. He seemed surprised and asked me how it could be done.

I explained that we had spent a great deal of time and thought in increasing the labor efficiency in that department. Starting with an average of less than two

machines per operator we were then operating three plus machines per operator. Investment and expense items remaining practically constant with direct labor reduced, the *percentage overhead* was naturally increased. Now, by putting the department on a basis of one machine per operator I could very easily attain a lower percentage overhead than that with which we started.

But, he objected, that process of reducing overhead would increase cost.

I agreed with him and he left, convinced that unit cost was of more importance than the ratio between expense charges and direct labor.

If you have emptied that scrap basket of overhead and have examined and analyzed all the accounts that have been thrown there, you will have set many of them aside as unusable for your purpose of fixing the foreman's responsibility. Many of the "overhead accounts" record expenditures over which the foreman has no control, direct or indirect.

Workings of the Control Account

After eliminating these accounts there will remain a number of others which are very directly within the control of the foreman. Before they are lumped together and apportioned to the direct labor to give a "percentage overhead" these accounts appear as so many dollars and cents per unit of time. In this form they are tangible, definite things for which the foreman can be held accountable. If a foreman's attention is directed to the fact that his scrappage with a given production amounted to \$200 this month as compared with \$150 last month, he is faced with a pretty definite and workable fact. If he is told that his distributed die cost per armature has increased from 6 cents to 7 cents he is likely to find out what is wrong in his die-handling and punch press practice. If, in a piece work shop he is faced with the fact that against a general shop average of 90 per cent the percentage of piece work in his productive payroll is only 75 per cent he will spend more time improving his showing in respect of this control account than in hunting an alibi.

We came to the conclusion that we must make these control accounts live issues to each foreman. To accomplish this we set up three definite objectives:

1. To keep the control accounts before the foreman in such form that he could check himself and consequently not wait for his superior to call him to account.
2. To keep the control accounts before the foreman in such form that he could visualize their *tendencies*.
3. To keep the control accounts before the foreman in such form as to encourage a spirit of competition between departments.

These objectives were attained by supplying to each foreman a set of coordinate sheets on which a graphic record of each control account was to be kept for a six months' period. The weekly report sheet giving the tabulation of control accounts was greatly simplified and the foreman was required to *personally* transfer the record from the accounting department's report sheet to this graphic record. This meant, for each account, the location of a single point on the previously prepared coordinate sheet and the drawing of a single straight line. This involved for all accounts perhaps ten or fifteen minutes per week of the foreman's time.

Obviously a foreman could hardly perform this operation without visualizing not only the value of the item but the tendency of the account.

He knew that his supervisor might ask to inspect his record at any time. But with this graphic record he

was almost invariably at work correcting any wrong tendency at its source before his supervisor looked at the record.

Records of various departments were compared in foremen's meetings from time to time, and notes from the superintendent either commending plus-average performance or calling attention to sub-average accomplishment were sent out frequently. But the foremen, independent of the meetings and the notes, having their records in continuous graphic form, were comparing notes one with another continuously.

This simple plan of graphic statistical control, operated by the foremen themselves, proved to be another long step toward making the foremen the general managers of their departments—toward running the last alibi into its hole.

In the foregoing, much has been said that might be questioned as unsupported theory; that might be condemned as unnecessary and wasteful "red tape." Had no tangible result been achieved to prove the soundness of these projects, they would not be offered for serious consideration. These theories were evolved and these practices instituted over a period beginning in 1916. It is unnecessary to remind one that these were strenuous and troublesome days in factory management. During this hectic period our labor efficiency showed continuous improvement. Costs were kept down out of all proportion to increases in material costs and labor earnings.

The accompanying chart tells an interesting story rather graphically. The lower line represents the selling price in connection with one of our major contracts. The upper lines represent labor earnings and commodity prices which affected our costs. Inasmuch as the profit percentage was practically constant, the lower line can be taken to represent the cost history of the apparatus. It will be noted that with labor earnings ranging to 107 per cent above 1916 base, and pig iron prices showing an increase to peaks of 160 per cent and 170 per cent, we were able to keep our selling price down to an increase of only 28 per cent.

This result was not obtained solely as a result of the particular practices described in this article. Many other factors contributed greatly. But if I were asked to designate the major factor which brought about this rather interesting economic result, I should say that it was "taking the alibis out of production."

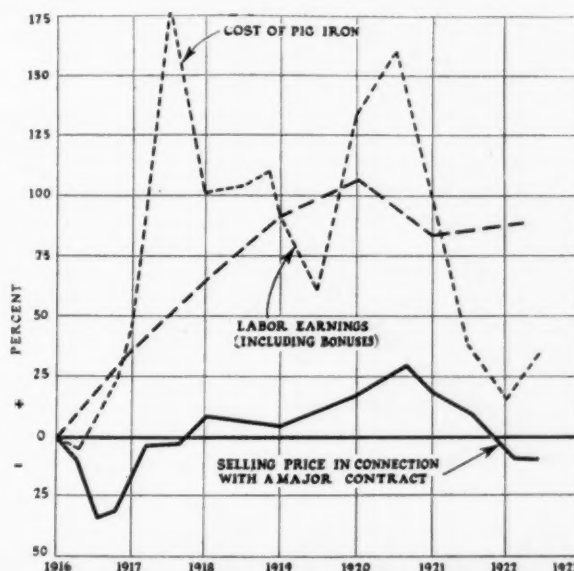


Chart showing small increase in selling price in comparison with large increases in material and labor costs

Just Among Ourselves

Prices Come to Fore As Costs Keep Rising

AFTER a considerable period of practical stabilization, the price question has again come to the front. While prospective increases will be moderate and undoubtedly will be justified by the higher cost of materials, unless there is to be some sacrifice of profits by vehicle manufacturers, it would be better for the industry if they could be avoided. A series of price increases will be followed inevitably by a series of price decreases and the interval between will be comparatively short. Conditions now are not comparable to those of the war and post armistice periods with their steadily rising markets. The industry would be in a much stronger position for the long swing if it could get through without tinkering with prices. The general, long swing trend of prices is much more likely to be down than up.

Almost as Many Cars As There Are Telephones

TELEPHONE company statisticians have figured out that there are about 14,500,000 phones in the United States, or one for about every eight persons on the basis of 110,000,000 population. This is an amazing showing, considering the comparative youth of this means of communication, but it is not half so amazing as the fact that there are approximately 12,500,000 motor vehicles in the country, or one for about every nine persons. The automobile is even younger than the telephone. It would be hard to

imagine, however, what the country would do if it had to get along without either, as it did once. It is almost literally true that every man, woman and child in the United States now has access to both.

Some New Models Will Have Four-Wheel Brakes

FOUR-WHEEL brakes promise to be the next general engineering development in the passenger car field. They already are widely used in Europe and a dozen or more American companies are prepared to put them into use on short notice. Large production companies which have been experimenting with them for some time seem to have hesitated to become pioneers in their use in this country, chiefly because of the additional expense involved. They are ready to join the procession, however, if competition forces their hands. It is practically certain that when the new models begin coming out in August some of them will be equipped with the new braking system.

Farm Implement Sales Are Expanding in South

WHILE tire manufacturers are viewing the cotton situation with apprehension because the visible supply will be practically wiped out at the end of the cotton year on July 31, southern planters are not manifesting any especial grief. Their position has been much improved because of the relatively greater returns from the last crop. This

is evidenced by the fact that the volume of sales by farm implement dealers in the Atlanta Federal reserve district showed an increase of 96.9 per cent in January as compared with the same month in 1921. Cotton growers are being urged to make every possible effort to destroy the boll weevil which, it is estimated, destroyed more than 6,000,000 bales in 1921. Freezing temperatures during the winter are believed to have destroyed large numbers of the pest and some progress is being made in working out scientific means of combating it.

Implement Makers See Secondary Inflation Evils

INCREASING demand for farm implements naturally is more gratifying to the manufacturers of them than to anybody else. Although the annual report of the International Harvester Co. contains a hang-over of grief, an optimistic note is found in the statement that "the volume of business now written for 1923 justifies the hope of improvement this year." Earnings last year amounted to only 2.6 per cent on the actual capital invested. This fact may account for the complaint that "the most difficult problem confronting this industry today is the tendency of the so-called secondary inflation to raise the cost of labor and material to a point where the farmer cannot afford to buy the product." It has been the contention of the farmer, on the other hand, that farm implement makers were not willing to take their losses in 1921 as did the

More or Less Pertinent Comment on Topics of Current Interest to Men in the Industry

automotive industry and bring prices down to rock bottom.

General Motors Explains Losses Under Old Regime

PRESIDENT DU PONT of General Motors Corp., in his annual report to stockholders, says that "the financial misfortunes of the corporation in the past were only slightly related to the manufacture and sale of its products, but these misfortunes were directly related to loose and uncontrolled methods which are now corrected." He adds that these troubles were not related to "an ill-financed expansion program." Thus the issue is joined with W. C. Durant, his predecessor, whose friends contend that he stoutly opposed policies which cost the corporation heavily and that he lost \$92,000,000 in a vain effort to maintain the value of the common stock for the benefit of investors.

Couzens Says Railroads Are Chloroforming Public

SENATOR COUZENS of Michigan is suspicious of the sundry investigations of the transportation problem which have been launched recently. He believes they are a part of the railroad propaganda system which is designed to chloroform the public by making it believe the carriers' troubles are much more serious than they really are. It's an interesting speculation anyway. Almost equally interesting is the statement of the Senator that his

former partner, Henry Ford, seems able to improve rail service and increase wages while lowering operating costs. Ford and Couzens haven't been especially intimate in recent years. The industry will be mightily interested if diplomatic relations are resumed. So will the politicians.

Ford Has the Cash To Start Chain of Banks

NOW comes the report that Henry Ford is about to establish a chain of banks and perhaps become an international banker himself. The story may or may not be true but he has the cash to go into the business unassisted if he so desires. He carries balances in a surprisingly large number of banks, many of them to help finance his dealers, and a banking system of his own might expedite this work. There are banks which assert that Ford deposits \$1,000,000 or \$2,000,000 with them and then apparently forgets all about it until about five minutes before closing time some day when he demands it in cash, thus giving them nervous prostration.

Ford and Durant Both War Against "Interests"

IF Ford does decide to follow W. C. Durant into the banking field, on a larger scale, both of them will be coming into conflict again with their dearest enemies—the "interests" which inhabit the district generally but somewhat inaccurately labeled Wall Street. It is rather strange that

two big men in the same industry, but of such radically different types, should both have declared war on the big bankers and their allies. In recent years Ford has had only one experience with banks. That was when he borrowed \$75,000,000 in 1919 to buy out minority interests in the company. The banks almost got him in 1921 but not quite. That was when he staged his marvelous financial come-back with the assistance of his dealers. Durant has had numerous encounters with bankers and brokers, especially brokers, and he doesn't care for them particularly.

Ready to Start Work On Simplification

M. L. HEMINWAY, general manager of the M. & A. M. A., who was elected chairman of the Simplification Conference Committee, is about ready to appoint his associates who will represent all kinds of organizations within the industry. He has no illusions about the job ahead of him and realizes fully that if really tangible results are achieved it will mean a lot of hard work. This has been evidenced by the missionary work done in the past. The committee proposes to center its efforts at the beginning on a few simple standards to which there can be no great opposition and keep hammering away until they are adopted generally. We are certain the committee will accomplish something worth while. The only thing we don't like about it is the name. To the uninitiated it might mean almost anything.

J. D.

"Take Highways Out of Politics," Demand of Engineers

Far-reaching recommendations result of Governor Pinchot's conference. Twenty-one States represented. Fuel tax endorsed. Uniform State laws and regulations held most pressing need. Reckless drivers denounced. Rigid examinations advocated.

By James Dalton

GIFFORD PINCHOT, Governor of Pennsylvania, is a practical man, even if he is classed as a "progressive," and he believes that experience is the best teacher. When he wanted to get a lot of information in a short time on the best methods of building highways and regulating traffic over them, he decided to call a conference of the men who know most about roads.

Accordingly he invited the highway departments of all the States to send representatives to a conference at Harrisburg last Friday and Saturday. The highway commissioners or chief engineers of twenty-one States responded. There were four three-hour sessions of the conference and when the stenographer gets through transcribing his notes Governor Pinchot certainly will have a lot of information. The chief problem which will confront him and P. D. Wright, his highway commissioner, will be to determine just how much of this information can be applied to the highways in the State of Pennsylvania.

At the close of the conference two facts stood out most prominently. They were:

There can be no uniformity in methods of construction or materials used in the various States because soil and traffic conditions vary so widely and because of differences in financing methods, which make the problems chiefly local.

There can and should be uniformity in fundamental principles of traffic regulation, such as those relating to weights, speeds and licensing. The conferees were warned, in fact, that unless the States make definite progress in the adoption of uniform laws the Federal government will step in and enact regulations covering interstate traffic.

Only two resolutions were adopted by the conference and both were proposed by Colonel Frederick Stuart Greene, highway commissioner of New York. They were:

1. It is the sense of this conference that it would be highly desirable to have uniform laws enacted by the States regulating the dimensions and wheel loads of motor vehicles.

2. It is the sense of this conference that the policy of requiring users of roads to pay for the service rendered through a gasoline tax is a sound one and that all revenue from such a tax should be applied to maintenance and construction.

The Committee on Conclusions, of which Thomas H. MacDonald, chief of the Bureau of Public Roads was chairman and which included Col. F. S. Greene of New York; Arthur M. Dean, Massachusetts; Frank Page, North Carolina; Paul Sargent, Maine; J. N. Mackall, Maryland; Clifford Older, Illinois; H. G. Shirley, Virginia; C. J. Bennett of Connecticut and William H. Connell, Pennsylvania, presented the following report to Governor Pinchot late Saturday night:

"The construction, maintenance, financing and operation of highways is becoming more and more a question of nation-wide transportation and less one of neighborhood convenience. There are two general phases to every problem coming before a State highway department for solution—the business and the technical. A majority of the States have recognized this fact by providing for either engineer commissioners or technically trained engineer executives. We believe this principle is sound fundamentally and urge the State authorities, both executive and legislative, to provide at all times strong engineering control in the administrative and executive work of their State highway departments, and engineering supervision of the construction, maintenance and operation of the highway systems.

"To this end we urge that these departments be removed from political influences and that continuity of service be preserved for a sufficient period to insure stabilized policies. In no other way is it possible to safeguard and protect the interests of the citizen who is paying for the roads.

Equitable Distribution of Costs

"State highway departments, with their knowledge of the geography and topography of the States, should determine without legislative or other interference what roads or systems of road should be constructed and maintained with State funds and should not be governed by legislation as to types and costs of construction.

"The cost of building and maintaining an adequate system of highways should be distributed equitably among the sources of highway revenue in proportion to the benefits derived from the improvement.

"The permanent features of original construction of highways should be financed on the 'pay as you go' plan or from the proceeds of serial bonds, according to the state of development of the highway system now existing in the several States.

"The policy of requiring the user of the roads to pay

for the service received through a license and gasoline tax is a sound one and all revenues from such sources should be applied primarily to the maintenance and reconstruction of highways.

"Owing to variations in climate, soil, traffic conditions and available materials, no one standard type of pavement is practical for the country or even for a State.

"Granite block, brick and bituminous tops on a concrete foundation and a concrete pavement may be termed as construction of the first class; the so-called flexible types of pavements may be termed as construction of the second class; and gravel, sand and clay or other top soil roads may be termed as construction of the third class.

"The progressive method of construction, whereby the grading, structures and drainage are first completed and the hard-surface pavement laid later on, is both a practical and at times the most advantageous method of highway construction.

"Unless adequate maintenance is provided for, initial construction of highways should not be undertaken at all.

"The same engineer who builds the roads should be held responsible for their upkeep.

"Each State highway department should establish a traffic bureau to make a highway transport survey in all its phases; to determine present and forecast future traffic conditions; to assist in the selection of the economic road construction.

"Efforts should be made, in cooperation with motor vehicle officials, to establish as soon as possible uniform motor vehicle laws and regulations, so that the user of the road may travel under uniform laws wherever he goes.

Uniform Laws Desirable

"It is highly desirable that a uniform law be enacted by the States of the Union regulating the dimensions of motor-driven vehicles and the wheel load of such vehicles.

"An effort should be made to provide proper standard devices for the protection of the road user and the prevention of accidents, and no person should be allowed to operate a motor-driven vehicle upon a public highway until such driver has been examined and a license showing competence has been granted."

In some respects the conference was unique. It was the first of the kind ever called by a Governor to get information about highway building and highway transport. In the second place, the evils resulting from mixing politics with road building and regulation were discussed with unusual freedom. In the third place all the delegates were much concerned over the reaction of taxpayers against voting funds for the construction of roads although their fears were not voiced publicly.

There were wide differences of opinion on every subject considered, from the relative cost of maintaining various types of road surfaces to the advisability of having traffic control under the direction of highway departments.

While the engineers, naturally, were more interested in discussions about the actual construction of roads, it was evident they felt the need for uniformity of regulation to be a more pressing problem. They seemed to feel that with the studies they have made of soil and traffic conditions in their States, together with their knowledge of actual road building, they can be relied upon to provide reasonably efficient road surfaces. They are hampered in this work chiefly by political entanglements and considerations of finance.

These highway engineers are proud of their profession and they are imbued with high ideals of service to the public. They admit the mistakes of the past in under-

"**M**OST highway statutes are scissors and paste pot laws. We need scientific laws covering weights and overloading. It appears that the roads can carry loads within the weight limits prescribed thus far. Where they fail, it is because of improper regulation or enforcement. There should be a pronouncement against too drastic regulation of the motor vehicle. It is the only means of flexible individual transportation. The weights and kinds of vehicles should be adapted to our needs as individuals."—Chief MacDonald, Bureau of Public Roads.

estimating the amazing growth of traffic and they feel that if they fail properly to gage the density of traffic five or ten years hence, the fault will be theirs.

A study of traffic conditions in each State as a basis for future needs was advocated strongly by Chief MacDonald of the Bureau of Public Roads. He said the government is prepared to pay a part of the expense of such surveys in every State and there was practical unanimity in the belief that such work should be undertaken by every highway department which has to contend with dense traffic on some of its roads.

Nothing resembling antagonism toward the automotive industry was voiced by any of the speakers. Few of the officials seemed to feel that heavier tax burdens should be levied against users of motor vehicles or that they should be forced to pay all the expense of road building. It seemed to be the feeling, rather, that primary consideration should be given the needs of highway transport and that the roads should be as good as traffic warrants.

There was evident, however, a strong determination to cut down accidents and to prevent needless destruction of highways by overloading and overspeeding. This determination was voiced first by Governor Pinchot in opening the conference. He prefaced his remarks with the statement that he was an enthusiastic motorist and an inveterate user of the highways but, he added, there are too many ignorant, unskillful and reckless drivers.

Number of Intoxicated Drivers Gains

The Governor quoted gruesome Pennsylvania accident statistics to prove his contention. He said there were 1157 deaths in Pennsylvania in 1922 as the result of automobile accidents and that a large percentage of them were due to the use of intoxicating liquor by drivers.

"The best figures I can find," he said, "indicate that 11,000 persons were killed and 42,000 injured in automobile accidents in the United States in 1922, while property valued at more than \$1,000,000,000 was destroyed.

"The vast majority of automobile drivers are careful and law-abiding. It is true that the death rate per 1000 motor vehicles has decreased and this is gratifying until we come to consider the actual risk to the average person. Thus, in Pennsylvania, the number of deaths per motor vehicle accidents per 100,000 of the population rose from 5 in 1915 to 14 in 1922 which means that every man, woman and child in this State is about three times as likely to be killed by a motor vehicle in 1923 as he or she would have been in 1915.

"I recognize the added risk naturally entailed by the enormous increase of automobiles, but the essential fact is that the child on the way to school, the woman crossing the highway for her marketing or shopping and the

"IT is not the great mass of motor drivers that needs to be restrained. They are fathers, mothers, good citizens like the rest of us—their first interest is safety, not speed. But the reckless speed maniac, the ignorant blunderer and the man who sets his pleasure or convenience before the safety of children, or the common human rights of the men and women who walk over and across our highways is the person who needs restraint. We must do whatever is necessary to stop this slaughter."—Governor Pinchot.

man whose duty calls him where traffic runs are each three times more likely today to a fatal accident than was the case less than ten years ago. The worst of it is that one-third of those killed in automobile accidents are children.

"It is not the great mass of motor drivers that needs to be restrained. They are fathers, mothers, good citizens like the rest of us—their first interest is safety, not speed. But the reckless speed maniac, the ignorant blunderer and the man who sets his pleasure or convenience before the safety of children, or the common human rights of the men and women who walk over and across our highways is the person who needs restraint.

"We must do whatever is necessary to stop this slaughter. The people of America have suffered too long from needless, senseless killings by reckless, incompetent and drunken drivers. I, for one, propose to use the power I have to prevent it. There are, I believe, few who will dispute the fact that more than half the present accidents are utterly unnecessary. In my opinion, proper traffic regulations, properly enforced, would reduce them by more than half.

Lax Laws Cause Accidents

"Laxity in the issuance of licenses in one State is inevitably translated into needless accidents in another. Poor traffic regulations or carelessness in the enforcement of good ones resulting in habits of reckless and incompetent driving necessarily carry their menace far beyond the borders of the States in which they take their rise. From very numerous points of view, sound arguments arise for the greatest practical uniformity in traffic regulations throughout the United States."

The menace of the intoxicated driver also was emphasized by William L. Dill, New Jersey Commissioner of Motor Vehicles. He attacked the motor laws of Pennsylvania and New York as largely responsible for this condition in New Jersey.

"The halt, the lame and the blind may drive automobiles in Pennsylvania and New York," Dill said, "because neither State requires an examination of drivers."

Dill pointed out that New Jersey insists upon the examination of everyone who will drive a motor vehicle in New Jersey. This includes a practical test of the motorists' knowledge as well as a physical test, written and oral examination.

Dill advocated registration of trucks upon the bearing surfaces of tires but in no case over their rated capacity. He thought the maximum gross weight of 30,000 lb., fixed as the limit in New Jersey was too high, although it is seldom now that the flanges of the wheels come into contact with road surfaces. Some means should be adopted to determine what is the largest truck which should be permitted to operate.

Dill praised the regulatory laws of Connecticut and Maryland. He asserted that the idea of giving a perpetual driver's license was wrong because any driver might develop some physical defect which would make him a menace. All licenses in New Jersey expire annually and Dill explained the means provided for revocation of licenses together with jail terms and fines for motorists who endanger pedestrians by recklessness. Revocation of license is much more effective than any system of fines. Intoxication never was so rampant on the highways as now, he declared, but the license of the intoxicated driver is automatically revoked in New Jersey.

Benjamin G. Eynon, Pennsylvania registrar of motor vehicles, also expressed alarm over the increase in the number of drunken drivers. He said Pennsylvania hopes for legislation requiring a rigid examination of all applicants for licenses.

John A. McDonald, motor vehicle commissioner of Connecticut, said enforcement can be only as effective as the public will permit, but that the reckless driver can be eliminated if proper laws are enacted and money provided for enforcement. He added, however, that a uniform law would make regulation much more effective. Officers should be an aid to traffic rather than an obstruction.

Connecticut has found, McDonald said, that Connecticut trucks are willing to obey the laws about overloading and that the chief difficulty is with trucks from other States which permit a greater weight. That is the reason the Conference of Motor Vehicle Administrators is attempting to have weights standardized. The chief difficulty, he said, is in determining what is the proper weight. If that can be found, there will be no great difficulty in having it adopted in the Eastern and New England States, at least.

Ways to Prevent Overloading

Major H. J. Williams of Maryland described the methods employed there to prevent overloading. The most effective has been a rule requiring the operator of a truck to throw off at the roadside whatever surplus it carries over the permitted weight. He added that highway patrolmen in Maryland keep a careful record of all accidents in their territory and file reports at headquarters. This gives valuable data which show at what points on the highway system the hazards are too great, with the result that these defects sometimes can be remedied.

Clifford Older, Illinois chief engineer, said his State had adopted about the same method as Maryland to prevent overloading. Highway safety is promoted by a uniform system of signs of different shapes which indicate different degrees of danger. Words have been adopted to denote these degrees. When a motorist sees the word "danger" on a sign, it means that as a matter of self protection he should stop to see why he has been cautioned. The word "warning" means to slow up and be on the alert. These signs are lighted at night and they have greatly reduced the number of night accidents except for drunken drivers.

Older declared the question of what lights were used on highways to indicate danger was a serious question as red lights frequently are mistaken for tail lights. In this connection, it was explained that the Engineering Standards Committee is preparing a report on this question after an exhaustive survey.

In the discussion of truck weights, it was brought out that Maryland permits 20,000 lb., Pennsylvania, 24,000; New Jersey, 30,000; and New York, 28,000, so that a truck on its way from New York to Baltimore might be

compelled to unload four tons of its freight before it arrived at its destination.

H. G. Shirley, chairman of the Virginia State Highway Commission, told of the difficulties encountered in trying to work out a uniform motor vehicle law through the Motor Vehicle Conference Committee. He said that meetings were held for two years and that agreement was reached on practically all important points until the conferees got down to the size of wheels and wheel loads and that was the particular rock upon which they all foundered.

Chief MacDonald favored the development of highway transport under as few regulations as necessary to conserve life and property. He pointed out, however, that there is much inter-state motor traffic and that if the States failed to adopt uniform regulations the Federal government would have to do so because of the increasing public demand for the same laws in all States. For this reason, he advised progress in the task of bringing about uniformity.

Commissioner J. N. Mackall of Maryland said the competition between the truck makers and the road builders was similar to that between burglars and safe makers. He added that up to this time the burglar is ahead. If we are going to build roads to last for fifty years, traffic must be regulated more closely than it is now.

He added that since Maryland has limited weights to 20,000 lb., not a mile of road has failed. He believes that vehicle weights should be limited closely to what the roads will carry. Motor vehicle operators have the ability to pay and should be given the desire to pay. All States have weight limiting laws but the trouble is that they are not enforced. Most trucks are overloaded as to capacity and the elimination of overloads cuts down maintenance costs.

Duties of the Highway Engineer

The discussion of the experience of States in traffic regulations was opened by Charles J. Bennett, State highway commissioner of Connecticut. He said the highway engineer is entrusted with the job of providing roads over which motor cars may travel at all times. The engineer is selling service to the public and the problem of traffic regulation as connected with the design and maintenance of the road is a very important part of the work. He must study traffic conditions so he can go forward to design roads which will care for the traffic and provide regulations which will protect the public. The facts must be learned and applied to the problems at hand. He is coming sooner or later to the construction of roads which will be restricted to certain kinds of traffic.

For the proper protection of traffic there must be a system of signs at sharp curves, railroad crossings and so forth. Too many signs should not be used because over-use will breed contempt on the part of motorists. There should be standard forms for grade crossings as well as for dangerous curves. Dangerous sections should be marked in the roads themselves and these painted strips in the center should provide one-way traffic. He did not believe the highway departments should do the actual policing.

Taking up the subject of weights and speeds, he said the temptation to overload is particularly strong when the railroads are congested, but that punishment for overloading should be constant and drastic. There also should be seasonal restrictions so that loads will be made smaller in the spring when the roads always are in poorest condition. He pointed out that at times there is "super-congestion" and he cited one day on which

26,000 cars went into New Haven over seven roads in twelve hours without a single fatal accident, because of special care in policing.

Road construction, maintenance and use from the national standpoint were considered by Chief MacDonald. Too many unsound and unsatisfactory laws are proposed, he said, and some of them are enacted. It is time someone favored good ones. The two most important subjects relating to roads at this time are

"THE automotive industry has followed a highly intelligent policy by giving more attention to the poor man than to the rich. It might have kept the motor car in the luxury class but has devoted its energies to making cars available for everyone as individual transportation. The saturation point is far removed and probably never will be reached because it is possible for everyone to own a car."—Chief MacDonald, Bureau of Public Roads.

finance and operation. No less than 430 research projects are now in progress but 65 per cent of them relate to materials and only 11 per cent to the two most important problems.

The tremendous investment in rolling stock and highways makes them a huge economic problem. State highway departments have not had enough support from legislatures and executives, MacDonald declared.

The automotive industry, he said, has followed a highly intelligent policy by giving more attention to the poor man than to the rich. It might have kept the motor car in the luxury class but has devoted its energies to making cars available for everyone as individual transportation. The saturation point is far removed and probably never will be reached because it is possible for everyone to own a car.

The best guide for the future, MacDonald asserted, is the experience of the past, but some States are found taking up policies already discarded as failures in others after a fair trial. Highways should be taken out of politics and for that reason he felt the Harrisburg conference assumed great significance.

Taxation a Matter of Local Concern

With the number of motor vehicles now in use the public will pay the cost of improved roads whether it gets them or not. Much has been heard in the past two or three years about high taxes, but taxation is largely a matter of local concern. Bodies which levy taxes locally also expend the money, and if the public cannot get the road system it requires and demands through State action it will do so by local means through which it can control expenditures.

MacDonald declared that it should be a principle of highway building that all revenue from motor vehicles should be set aside for highway purposes. He added that a much larger mileage should be placed under patrol and be made available for use the year round. The cost of roads should be divided fairly among those who get the benefits.

"You can't build the entire highway system of the country with the revenue from motor vehicles," he asserted. "To attempt to do so would be unfair and uneconomic."

"THE halt, the lame and the blind may drive automobiles in Pennsylvania and New York because neither State requires an examination of drivers. The States have been too solicitous about revenue and not solicitous enough about curbing reckless drivers. Seventy-five per cent of our fatal accidents are due to speed. Intoxication never was so rampant on the highways as now."—William L. Dill, motor vehicle commissioner of New Jersey.

Where highway building programs are well under way, the remainder can be financed largely from current funds, but where they are just being undertaken, bond issues should be used. The expense of building local roads should be taxed against adjoining property.

"Regulation of traffic is important but it should be regulated only to assure safety and prevent injury to roads through overloading and overspeeding," he declared.

MacDonald then cited some of the striking facts shown by a traffic survey in Connecticut. One point brought out is that 25 per cent of the truck tonnage is carried from 0 to 9 miles, 50 per cent from 10 to 69 miles, and 25 per cent over 70 miles. This, he said, was a pretty effective answer to the contention of railroads that trucks are making inroads on their reservation, because anything less than 70 miles is a short haul in the New England district.

"Most highway statutes are scissors and paste pot laws," he declared. "We need scientific laws covering weights and overloading. It appears that the roads can carry loads within the weight limits prescribed thus far. Where they fail, it is because of improper regulation or enforcement. There should be a pronouncement against too drastic regulation of the motor vehicle. It is the only means of flexible individual transportation. The weights and kinds of vehicles should be adapted to our needs as individuals."

MacDonald said that replacement of highways was properly chargeable against license fees provided the road was adequate to the needs of traffic when it was built but that if its construction was not adequate such a charge would be improper. The public in general benefits from the construction of roads and property is valuable only as it has or has not cheap transportation. There is a lot of bunk in the talk about taxes, MacDonald added. The poor man doesn't pay much for most of the levies are against property.

Engineers Interested in Maintenance

Much interest was manifested by the engineers in the subject of maintenance. Discussion of this problem was opened by Col. Greene of New York. By inference, at least, he was a strong advocate of the use of reinforced concrete pavement. Older of Illinois believes also that concrete is the most economical surface for main highways in his State. Practically all States which have their systems well under way are using concrete to some extent, but their opinions on its value are not so definite as Greene's and Older's.

The New York commissioner declared one of the curses of America is that we build temporarily. Most roads are too narrow and culverts too short. He believed a short

term serial bond the best method of financing with all motor vehicle fees used for maintenance. He thought that the fairest automobile tax would be to give the purchaser a license when he buys a car from the dealer and let the license last for the life of the car. The fee would range from a low one for a light car to a heavy one for a heavier car or truck with a minimum transfer fee. In addition, he would have a gasoline tax which might be variable from year to year.

"Let people pay for the miles they run and the roads they use," said Greene.

Greene quoted maintenance costs to show the comparative expense of maintaining different types of pavement. His figures showed that on one road it cost \$622 a mile to maintain a gravel pavement as compared with \$80 a mile for reinforced concrete on a road in the same section over which there passed an average of 13,489 vehicles a day in the month of August. Between Buffalo and Batavia, a stretch of three miles of bituminous macadam built in 1915, averaged \$447 a mile for maintenance, while 3½ miles of concrete built in 1914 averaged \$37 a mile.

Greene asserted that the first class concrete road would last at least twenty years but that bituminous macadam must be resurfaced at the end of ten years. He presented figures designed to show that the ultimate expense of concrete, including interest on investment and maintenance, would be less than bituminous macadam including interest, maintenance and resurfacing at the end of ten years. Under the circumstances, he felt that a State would be justified in spending the additional amount necessary to lay concrete rather than macadam highways.

Relative Merits of Road Materials

A. W. Dean, Massachusetts chief engineer, took issue with Greene on the relative value of concrete and bituminous macadam and the maintenance cost figures he gave did not show nearly so wide a difference. Concrete is all right in its place, he said, but so are other road building materials.

Charles M. Upham, chief engineer of North Carolina, discussed the factors which must govern highway building in a State which has not been engaged in good road building for a long period, and whose resources are not as large as those of densely populated States. He described the progressive system which has been adopted in North Carolina under which dirt or gravel surfaces are first applied on a substantial sub-grade and later replaced by a hard surface when traffic demands. Major L. D. Blauvelt of Colorado agreed with the position taken by Upham.

Shirley of Virginia said that most roads are being maintained a little better than public sentiment requires. In his opinion, highways mean more to the people of the country than any other problem except education. Highway building must be put before the people in such a way that public sentiment will support it. There is a feeling abroad that the work is costing too much, and that the expense of some types of pavement is too great.

In considering the number of years highway bond issues should cover, Chief MacDonald said there was a time when we needed all the capital we could get for the construction of railways. Now we need all our capital for highways but no one is wise enough to look ahead forty years and see what the great need will be then. He believes, therefore, that forty-year bonds are unwise, and that twenty-five years should be the limit.

State representatives at the conference in addition to those of Pennsylvania were:

Colorado, L. D. Blauvelt; Connecticut, Charles J. Bennett and John A. McDonald; Delaware, C. D.

Buck and I. Paul Jones; Georgia, Craig R. Arnold and George H. Carswell; Illinois, Clifford Older; Maine, Paul D. Sargent; Massachusetts, A. W. Dean; Maryland, J. N. Mackall and Maj. H. D. Williar, Jr.; Minnesota, O. L. Kipp; Mississippi, H. C. Dietzer; New Jersey, Percy H. Stewart and E. E. Reed; New York, Col. Frederick Stuart Greene; North Carolina,

Frank Page and Charles M. Upham; Ohio, Paul R. Murray; Oklahoma, Paul Nesbitt; Rhode Island, Abram L. Atwood; South Carolina, Charles H. Moorefield; Virginia, H. G. Shirley; West Virginia, Col. C. P. Fortney and H. E. Snyder; Wyoming, L. E. Laird; Thomas H. MacDonald, Chief of the Bureau of Public Roads, Washington.

Survey Shows Trucks Used Chiefly for Short Hauls

Analysis of Material Gathered in Connecticut Expected to Yield Information to Aid Highway Engineers

AMONG the interesting facts revealed by the survey of transportation in Connecticut conducted by the Bureau of Public Roads and the Connecticut State Highway Department since September, 1922, which will be included in the preliminary report of the bureau now nearing completion are the following:

1. During the three months from Sept. 11 to Dec. 2, 1922, approximately one-fourth of the total motor truck net tonnage was transported over the highways from 0 to 9 miles, one-half from 10 to 69 miles and one-fourth over 70 miles.

2. Analysis of the passenger vehicle information indicates that 35 per cent of the movement is for business purposes and 65 per cent for recreation. Passengers per vehicle average 1.7 when used for business and 3 when used for recreation. The average business mileage is 29.7 and the average recreational mileage 55.5 per cent.

3. A seasonal comparison of Connecticut highway transportation indicates that in January and February, 1923, motor truck traffic decreased 40 per cent below the October, 1922, traffic, while passenger vehicle traffic in January and February, 1923, was 68 per cent lower than in October, 1922.

4. Analysis of 10,645 loaded trucks from Sept. 11, 1922, to Dec. 2, 1922, shows that 29.6 per cent are overloaded beyond their rated capacity, and that with increasing width of truck bodies there is an increasing percentage of overloaded vehicles.

The survey is one of the most complete of its kind that has been undertaken. The data obtained form a daily record of highway transportation in a typical manufacturing area, and include, for what is believed to be the first time, all the facts necessary for a critical analysis of highway transportation in the New England area.

Survey Includes Two Types of Research

The traffic survey includes two types of researches: An intensive survey taken at eight key points throughout the State, and an extensive survey taken at fifty-six stations. Each intensive station is the center of a number of extensive stations. Observations have been made at each intensive station for one week every two months and will be continued in this way for a period of a year. By moving from station to station on a regular cycle of operation, seasonal variations of traffic are recorded. The extensive observations at the fifty-six selected stations are made for one day in each month. The stations are divided into districts, surrounding each intensive station, with seven stations in each district. The arrangement and operating schedules of the district stations are grouped to avoid duplicate recording of vehicles.

The observations made at the intensive stations relate only to truck traffic. Every truck passing the stations during the periods of operation is stopped, weighed and measured. The make and capacity of the vehicle is recorded, the commodity it carries is noted and inquiry is made as to origin and destination, frequency of trips and

whether the truck is engaged in a public trucking business or is operated in private business.

At the extensive stations both truck and passenger-car data are obtained, the information including the number and make of passenger cars and trucks passing the stations, the number of passengers, the capacity of trucks and the character of their cargoes, origin and destination, the number of trips per week made by the trucks and the time required for the trip, and whether the passenger cars are operated for business or recreation.

The analysis of the data is expected to serve as a valuable aid in allocating highway construction and maintenance funds, in determining seasonal variations in commodity and tonnage movement and in furnishing information as to the practice of truck overloading. Highway transportation information concerning the net tonnage of freight, kind of commodities, type of shipment and length of haul will be of value in analyzing the relation of motor transportation to other methods of transportation.

Weighing Connecting Rods

AMACHINE designed especially for weighing connecting rods and known as the Olsen-Lundgren Automatic Scale is now being marketed by the Tinius Olsen Testing Machine Co.

As will be seen from the accompanying cut, the scale has two platforms and two dials, so arranged as to facilitate matching rods which have the same weight at the big end and the same at the small end. The comparison is made against a master or standard rod, placed on the opposite side of the scale to the one being checked. With this machine it is said to be possible to weigh as many as 2500 connecting rods per day.

A sensitive scale, and consequently greater accuracy is secured by reason of the fact that the scale measures not the total weight of each end of the rod, but the difference between the weight of its two ends as compared

with the corresponding ends of the master rod. This makes it possible not only to bring the whole rod to a standard weight, but to be certain that the center of gravity of the rod is in the same corresponding position in each case.



Olsen-Lundgren scale for weighing connecting rods

Miller Building Six Novel Racing Cars for 1923 Speed Events

Are fitted with 122 cu. in. engines said to weigh 303 lb. and to turn at 4500 to 5000 r.p.m. Narrow frame and body help to minimize wind resistance. Cars are reported to have 100 in. wheelbase and 52 in. tread and to weigh 1353 lb.

ADVICE received from Los Angeles indicates that Harry A. Miller now has under construction six racing cars intended for use in the 500-mile race to be held on May 30 at Indianapolis. The car built for Tommy Milton is said to be undergoing speed tests on the Beverly Hills Speedway, where it is reported to have attained a speed of 112 miles per hour.

Of the other five cars, four are said to be for the Durant team and the sixth for Frank Elliott.

The accompanying cuts show some of the parts used in these cars, and photographs of the complete car now being tested by Milton.

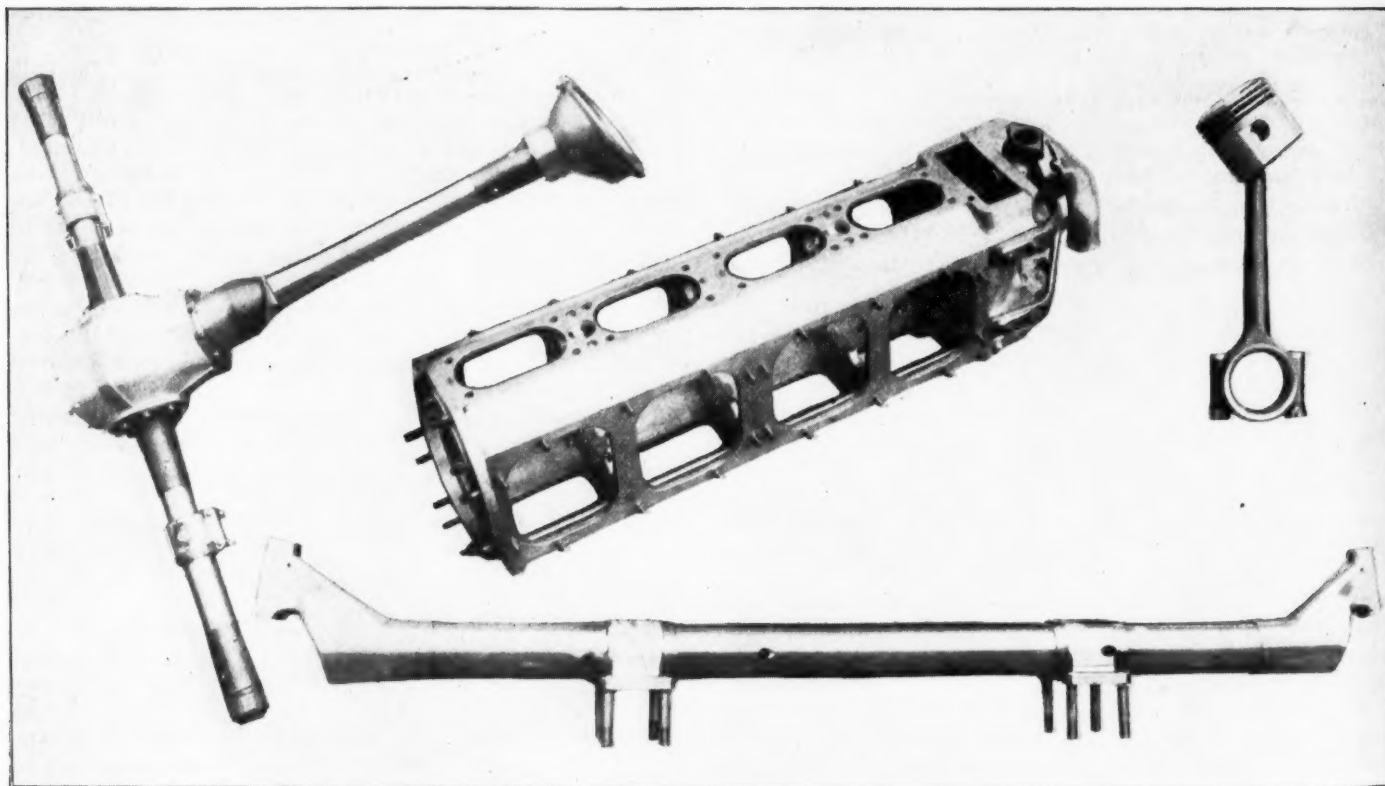
An effort has been made to minimize wind resistance by the use of a suitable streamline form of body and by making the frame as narrow as possible. The cars this year are said to have 720 sq. in. projected area as against 874 sq. in. on the cars with 183 cu. in. engines used last year. The weight of the complete car is given as 1353

lb. The cars are fitted with 8-cylinder engines said to weigh 303 lbs. The weight of the springs is given as 12 lb. each, and that of the rear end assembly, without gears, as 69 lb.

The wheelbase is understood to be 100 in. and the tread as 52 in. Width of frame is given as 21 in. and of the body, 18 in.

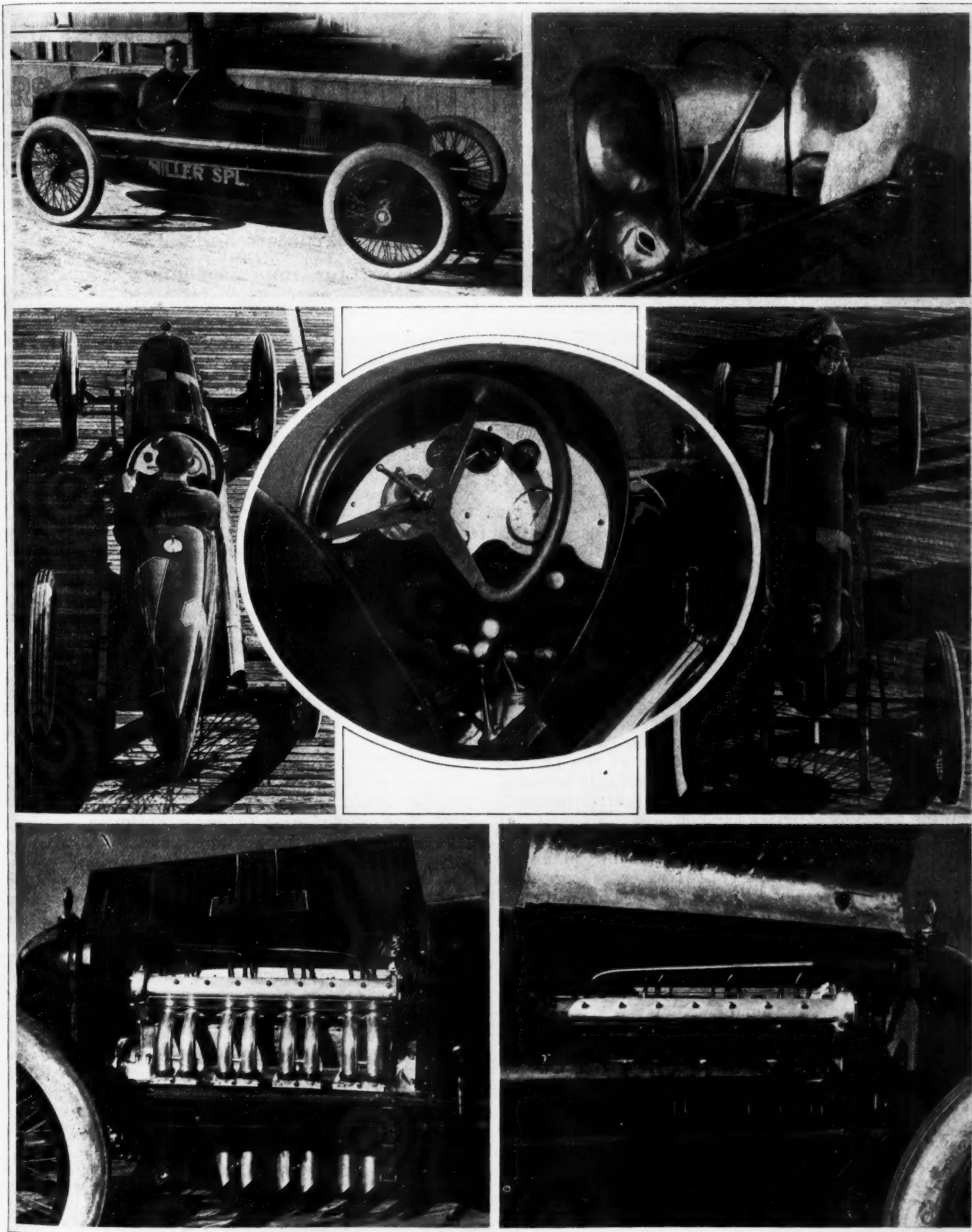
There are no brakes on the rear wheels and the front wheel brake drums are said to weigh only 6¼ lb. The capacity of the fuel tank is 26 gal.

The cars will, of course, have seating space for the driver only. As will be seen by one of the cuts, the lower portion of the steering wheel has been cut away to afford additional clearance for the driver's legs. The driver straddles the steering column. Hand brake and gear-shift levers are centrally located. Floor boards are omitted to save weight. The maximum engine speed is said to be from 4500 to 5000 r.p.m.



Connecting rod, crankcase, rear axle assembly and front axle used in racing cars designed by Harry A. Miller. Note that there are no brake drums attached to the rear axle. (International.)

Miller Racing Car with 122 cu. in. Engine, Entered at Indianapolis



New racing car, equipped with 122 cu. in. engine, built by Harry A. Miller. It is to be driven by Tommy Milton and is No. 1 car entered in the 500-mile race to be held in Indianapolis on May 30. The engine is said to have a maximum speed of 4500 to 5000 r.p.m. and to weigh 303 lbs. The wheelbase is given as 100 in. and the tread as 52 in. The frame is said to be 21 in. wide

Manufacturer and Dealer Prosperity Hit by Used Car Trading

Factories affected when distributing organizations lose money through bidding in old vehicles. Territorial analysis should prevent overloading with new cars. General Motors bulletin outlines situation and offers suggestions for improvement.

AUTOMOTIVE INDUSTRIES presents herewith a bulletin on the used car situation prepared for members of the Service Managers' Association of the General Motors Corp. by M. W. Franklin of the Advisory Staff. It is an interesting presentation of the manufacturer's viewpoint on a highly important subject and admits frankly that a factory cannot prosper unless its dealers are prosperous and contented. They cannot prosper if they lose money heavily on used cars. Some of Franklin's assertions may be open to argument but he has made a thoughtful contribution to the literature on a subject to which manufacturers have given too little attention.

The bulletin follows:

THE used car problem is attracting a great deal of attention these days. In fact, it may even be said that it is the subject of first interest to the dealers.

There are many conflicting views extant but the matter is very simple when examined logically. The following analysis attempts to do this.

In general, the dealers contend that the manufacturers should concern themselves with the used car problem while the manufacturers quite as generally hold that it is a purely dealer affair and that the latter must solve it.

When any person buys a car it represents a relatively large investment to him. Whether he spends \$500 or \$5,000 it is, to him, a large outlay. Now, if this man is to be taught that at the end of one, two or, at most, three years, his investment will be totally swallowed up, obliterated, the motor car industry will soon come to grief. It is bad enough to have the property become worthless in six and a fraction years, but if the public are to be shown that they must make entirely new outlays for cars every two or three years, the car sales prospects will become a vanishing quantity.

Saturation Point Already Here

Almost everybody has a car. The saturation thing of which we hear so much is not coming, for the very good reason that it is here. The percentage of replacement cars today is pretty high and indicates that almost the whole quota of available car owners among the population already are supplied. New first time owners are developing slowly but normally. They represent about 10 per cent of all purchasers.

Now, when a car owner wants a new car, he naturally and quite properly wishes to realize as much as he can on his used car. He would be a questionable credit risk if he did not. He asks the dealer to dispose of his car for him and this, too, is natural and eminently proper.

The average car owner has neither time nor suitable facilities for marketing used cars, but the dealer has both of these. He has space in which to display cars to advantage and also he has facilities for putting the car into good condition and for advertising, effectually, that the car is for sale.

Even if the car owner were willing to advertise and to display the car, his handicaps would render him relatively helpless as compared with the dealer. His advertising would reach relatively few prospects and his total time and opportunities in which to display the car would be short and inconvenient. On the other hand, the dealer has hundreds of people coming into his place continually looking for cars to buy.

In substance, nobody is better situated than is the car dealer to obtain the quickest and best return for the used car and, therefore, the dealer should dispose of the used car for the customer. Anybody wanting specialized work of any kind goes to a specialist and doesn't attempt it himself. This applies to car selling as well as to dentistry.

Should Dealer Buy Used Car Outright?

The next question is whether the dealer should take the used car off the customer's hands or should he limit himself to an endeavor to find a customer for it and then to consummate the sale.

The answer will depend on local conditions only. If the owner will accept a figure which will enable the dealer to resell the car at a fair margin of profit to himself, and if the dealer is not unduly stocked with used cars, he should unquestionably buy the used car. If the owner wants the used car sold before he will purchase a new one, and the dealer cannot purchase the used car outright on account of local conditions, he should offer to accept the purchaser's note for the amount asked for the used car, payable when the latter shall have been sold.

Wherever the dealer guarantees to obtain a certain figure in selling a used car for a customer, he is practically buying the car at that same figure and he might as well close the deal first as last, and accept the used car in trade.

Wherever the dealer undertakes to sell a used car for a customer he is entitled to a gross profit which will defray all of his expenses in the transaction and, in addition, give him a net profit equal to that of a new car sale at the price involved.

So far, the matter concerns the dealer only. We will now consider the manufacturer's interest in the problem. Every problem of the dealer is a concern of the

manufacturer even if only indirectly, but the precise relationship of each of them to the matter should not be confused. The manufacturer is the best friend the dealer has, because the manufacturer is absolutely dependent on the prosperous dealer for his own prosperity. Self interest, if nothing else, compels the manufacturer to interest himself in the dealer's welfare. However, excepting for the circumstance that the manufacturer demands that the dealer shall dispose of a certain number of cars in his territory, and but for a certain lack of business education on the part of some dealers, the manufacturer has no direct responsibility in the used car situation.

Whenever a manufacturer allows a trading discount he is simply adding that amount to his car price. The man who buys a new car, without trading in, pays a higher price than the car is worth. The man who trades in gets a car in a lower price class than its price indicates; he is deceived. The dealers in other cars are not backward in explaining to prospects that they are being asked more than the trading discount car is really worth. Dealers, generally, are against trading discounts because these really mean a bonus to the manufacturer on first time sales, and a fictitiously high list price on the new car. This, in the long run, merely makes sales resistance, and adds to the dealer's difficulties. It would be better for the dealer to lower the list price and thus enable them to draw more prospects.

New Car Pressure Causes Bidding

The dealer claims that the manufacturer forces him to dispose of a fixed allotment of cars in his territory. The competitive dealers in the territory, also, have quotas to meet. This causes bidding, among the dealers, for the car customers and, as out and out price cutting is not in vogue, the competition results in buying in the used cars, by the dealers, at ruinous prices.

The dealer is prone to forget that he is in business only to sell all the cars he possibly can at a profit and he begins to operate on the principle that his real aim is to outsell his competitors at any cost or loss. With a fixed quota of cars to move, the dealer is in terror of losing any trade for fear his local competitor will make the sale.

The attitude of the manufacturer is based on logical enough grounds. In the first place he determines his list price from the number of cars he plans to produce and any curtailment would involve him in loss. The dealer must not forget that a loss to the manufacturer affects the dealer just as a loss to the dealer reacts on the manufacturer.

In the second place, the manufacturer makes a scientific survey of the country and ascertains how many car sales he has a right to expect in each geographical division. Then, when he gives an exclusive contract to some dealer for that locality, it is not unfair that the latter should be expected to move that many cars.

The only legitimate protest which the dealer can advance is that the manufacturer has overestimated the sales possibilities in the territory, but this matter should be debated and threshed out in advance of signing the contract. The dealer has access to the same statistics and reasoning as has the manufacturer. The dealer is intimately acquainted with his territory and if his protest against the manufacturer's estimate is based on sound facts and reasoning, he will have no difficulty in convincing the manufacturer. No far seeing manufacturer will cram an erroneous quota down the throat of a good dealer.

Besides this, no manufacturer is able to compel his dealers to do anything they do not want to do. There

are not enough good dealers to go around and the desirable dealers are in a position to obtain a fair deal from the manufacturers. The manufacturers naturally enough want to keep the dealers going at top speed, but no manufacturer is stupid enough deliberately to kill the goose which lays the golden egg.

Dealer Behavior Crux of Situation

The crux of the situation is the dealer behavior. As hinted at above, the dealers easily lose sight of their true purpose. When the dealers get the notion that they must outbid each other in every trade the scene changes into an auction sale wherein the owner knocks down the used car to the highest bidder and accepts a new car in part payment.

Every used car has a market value. This cannot be determined precisely but a very highly approximate value can be put on it by an experienced dealer. If the car is bought in at that market value, discounted properly to allow a resale profit, the purchase is no more hazardous than is the purchase of a new car for resale purposes.

Every used car offered for sale requires some servicing whether this be complete rebuilding or only an inspection and this servicing will cost the dealer something. This something, whatever its amount, must come from the sale of the car.

It costs at least as much in proportion for interest, storage, commissions, advertising and insurance to sell a used car as it does to sell a new car and this expense also must be included in the resale price of the used car.

The dealer selling a used car performs a real specialized service for the owner and the latter must expect to pay for the service rendered.

If the dealer is not loaded up he can buy any used car at the market price less the amount required to pay all expenses and also to yield him a profit on resale. If he gives more than this, he is losing money and no dealer can do this very long. It is better to let a trade go than to make it at a loss, and competitors who bid the highest for used cars do not last.

The so-called Boston plan is the answer, but its success in any community can be no stronger than the morale of the dealer organization. For this reason the precursor to the Boston plan, the so-called Saginaw plan, is somewhat preferable. The Saginaw plan depends more directly on the personal strength and influence of one man. Where any organization is not too large this is a wonderful advantage.

Fair Play Will Bring Solution

As soon as the dealers will play fairly with each other and realize that they are in business to sell cars, new and used, at a profit, as soon as they get out of the habit of thought that their mission is to outbid each other at used car auctions, just so soon will the used car problem be solved.

Practically everybody has some car now, and everybody values his car at something.

Consequently nearly every new car sale involves a used car sale. The dealer is very much better qualified to sell the used car to advantage than is the owner and he should undertake to do this, but only at a profit to himself.

The manufacturer is concerned in that he must have prosperous dealers, but he is responsible only in so far as he exerts pressure on the dealers to take excessive new car allotments. The manufacturer is justified in expecting that each dealer move a certain number of new cars, based on the conditions in his territory, but the dealer has the same right as the manufacturer to

predetermine this number. The size of the quota should be mutually satisfactory at the time the contract is made.

Trade-in allowances place a car in a price class which its quality does not warrant. The first time buyer pays the manufacturer a bonus over what he is willing to accept from a trade-in buyer, and the latter gets less car value than he thinks he is getting. Lowering the list price by the amount of the trade-in allowance would get

the dealers more sales and give the public a square deal.

Every used car has a market value depending upon the individual circumstances and this may be determined with reasonable accuracy.

If the dealers will purchase used cars only at this accepted valuation, if they will keep faith with one another and put their competitive efforts each into boosting his own cars, into service and into salesmanship, the used car problem will be solved.

New Truck Cooling System Adopted by Mack

A CHANGE has been made in the design of the cooling system on the Mack International trucks whereby the manufacture of the system has been facilitated, cleaning of the radiator tubes by means of a simple tool rendered possible and the need for a belt or other drive for the radiator fan obviated.

The radiator is now made in halves, each half forming one side of the cowl space. A blower of the squirrel cage type is mounted on the rear side of the engine flywheel, so that no special drive is required for the blower and, moreover, two bearings are eliminated. The impeller of the blower is surrounded by an aluminum housing in two parts, the discharge opening of which bolts over an opening in the cowl plates. The impeller is 20½ in. in diameter and has 60 steel blades riveted to annular disks. At the top of the cowl space is a V-shaped deflector which divides the air moved by the blower evenly between the halves of the radiator.

In the style of radiator formerly used on Mack trucks the tubes were curved to conform to the circumference of the blower impeller, and were without fins. In the new design there are large square cleaning plates over the tubes on top of the aluminum tanks, which extend across the tops of both sets of tubes. At the bottom of each group of tubes is a separate tank, on the outer side

of which is a cleaning port through which scale or other foreign material scraped from the tubes can be removed. The two lower tanks are connected by a copper tube terminating in a flexible hose coupling at each end.

Owing to the fact that the aluminum air duct of the blower is made in halves, it does not interfere with the removal of the engine from the frame. A protective screen is placed at the air entrance to the blower, through which air is drawn in from under the truck.

Standards for Wood Wheel Parts

LETTERS proposing the standardization of the tenon holes in steel felloes for wood wheels were discussed at a recent meeting of the Axle and Wheels Division of the Society of Automotive Engineers' Standards Committee. It was argued that while there is practically a standard among the wheel manufacturers at the present time, a published standard would be helpful. The dimensions given in the accompanying table were approved tentatively for adoption as S.A.E. Recommended Practice.

DIMENSIONS OF TENON HOLES FOR STEEL FELLOES		
Pneumatic-Tire Size, in.	Spoke Size, In.	Diameter of Tenon Hole, in.
3½-4	1¼	½
4	1⅜	⅝
4½	1½	⅞
5	1¾	¾

As "giant" pneumatic tires are not used on steel felloes, it was not felt necessary to include tire sizes above that of 5 in.

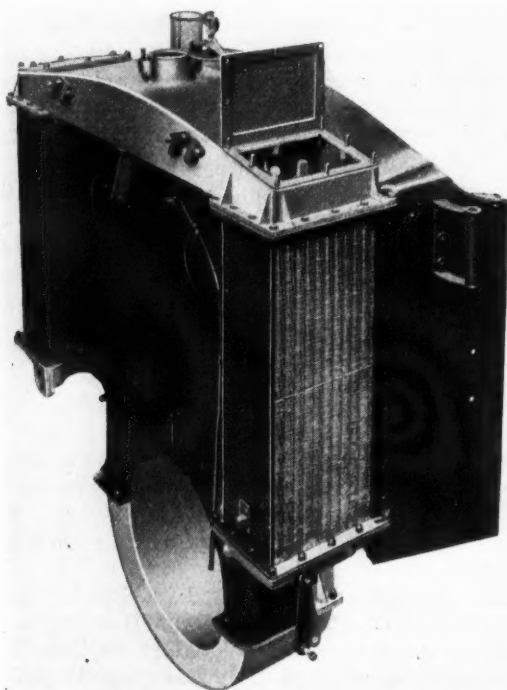
Passenger Car Front Wheel Hubs

Detailed dimensions for passenger car front-wheel wood hubs were decided upon tentatively at a recent meeting of the Axle and Wheels Division. The dimensions, which are given in the accompanying table, are intended to constitute an extension of the recommendation approved by the Standards Committee on Jan. 9.

PASSENGER-CAR FRONT-WHEEL WOOD HUBS

Hub Size	Outside Diameter of Hub	Distance Between Flanges	Flange Diameter	Flange Fillet Radius	Bolt-Circle Diameter	No. of Bolts	Bolt Size	Hub-Cap Thread
R0	2.1830 2.1860	1¼	6	⅜	5	6	⅜	2⅝-24
R1	3.0625 3.0655	1¼	7	¼	5¾	12	⅞	2⅝-16
R2	3.5000 3.5030	1⅝	7¼	¼	6	12	⅞	2⅝-16
R3	3.6875 3.6905	1½	7¾	⅜	6¼	12	⅞	3-16
R4	3.8125 3.8155	1¾	8	⅜	6¼	12	⅞	3⅝-16

Note: The data in the table apply to wheels with wood or steel felloes, that is to all wheels having wood hubs.



Mack truck radiator made in two sections. Each section forms one side of cowl space

German Priamus Chassis Replete with Novel Features

Front axle has live spindles and knuckle pivot in central plane of wheel. Steering gear crank is mounted in bracket separate from housing with connecting rod attached to nut. Roller bearings extensively used. Springs have no shackles.

By Benno R. Dierfeld

WHAT appears to be, in some respects, the most interesting new chassis to be produced by a German passenger car manufacturer for several months past is the new six-cylinder, 50-hp. Priamus built by the P. A. G. (Priamus Actien Gesellschaft) in Cologne. This chassis incorporates a number of features which, though not entirely new, are sufficiently novel to warrant study on the part of American automobile manufacturers and designers.

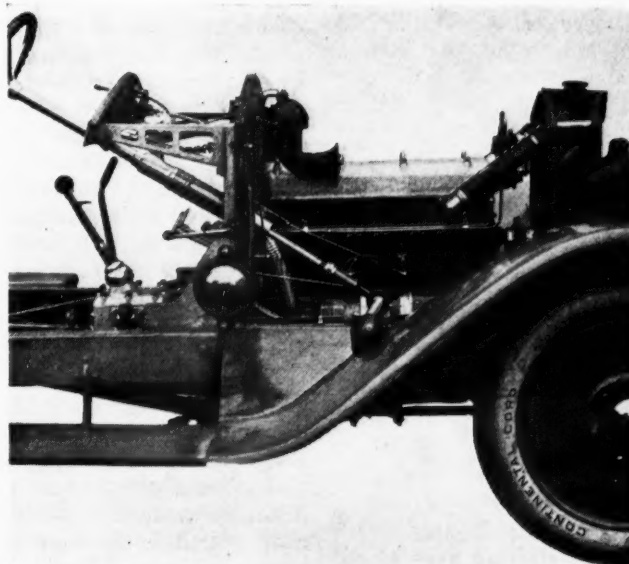
Among the unusual features are the peculiar design and arrangement of the screw and nut type steering gear, a front axle which combines a live axle spindle with a knuckle having its axis practically in the central plane of the wheel; an engine fitted with barrel roller type main bearings, and springs which have no shackles but are fitted with rollers between which the leaves of the spring slide.

Other features worthy of comment are the single-plate clutch, the gearset using cylindrical roller bearings, steel disk wheels with substantially flushed hubs and a two-tone horn, giving one note for use in city traffic and another louder note for use in the open country.

The manufacturers of the Priamus chassis have built passenger cars exclusively for some eighteen years. The works are of medium size and are now producing besides a four-cylinder model the six-cylinder chassis here described, which is intended primarily for export purposes. Although the car is built by the P. A. G. and designed by their chief engineer, M. van Amerigen, the engine is furnished by the Siemens & Halske Co., a branch factory of the large Siemens electrical works in Berlin-Nonnendamm.

As will be seen from the photograph of the right side of the chassis, the six-cylinder engine is characterized by an unusually clean external appearance. The cylinders

are of 70 mm. ($2\frac{3}{4}$ in.) bore and are cast in a single block. The stroke is 112 mm. or $4\frac{7}{16}$ in. The engine is said to develop 50 hp. at 2900 r.p.m. It is fitted with a detachable head which carries the overhead valves. These are actuated from an overhead camshaft through rocker arms, the camshaft being driven by helical gears. The crankshaft runs in three bearings with rollers of barrel shape.



Right side of Priamus chassis showing arrangement of steering gear

Cooling is of the thermosiphon type. The engine has two water outlets, each of which is connected to the radiator by a rubber hose. The radiator is steadied by steel rods attached to the water outlet fittings of the engine at their lower ends and to the radiator shell at their upper ends. Although the radiator is pointed, the point is less pronounced than in most cars of German design. The shell is of brass, nickel plated. The three-bladed fan is of cast aluminum and is driven by a rubber belt.

Engine lubrication is a combination of the splash and pressure system, the main bearings being fed with oil under pressure and other parts by splash.

The fuel tank is located inside the frame at the extreme rear end of the chassis and fuel is fed to the carburetor from a vacuum tank located on the front of the dash.

Ignition and lighting are effected by a combined Bosch magneto and dynamo on the right side of the engine. This unit is driven by silent chain. The spark is controlled partly by hand and partly by an automatic advance mechanism. Spark plugs are located on the left side of the engine and the cables are led transversely through the engine. The Bosch starting motor is arranged on the left side at the rear of the engine and drives through a pinion which engages with a gear cut in the flywheel. The battery is mounted inside the chassis frame.

A small power tire pump is arranged to be driven off the front end of the overhead camshaft.

The engine crankcase is of aluminum cast in two parts with the lower part serving as an oil pan, as in conventional practice.

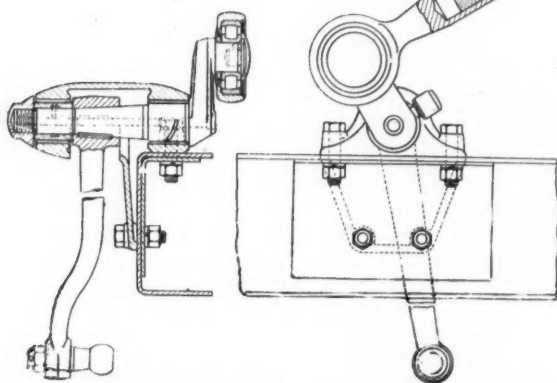
The exhaust manifold is cast integral with the removable cylinder head and makes a sharp right angle turn where it leaves the head. The exhaust pipe is swept slightly forward in order to clear and pass under the rear engine support.

Both the instrument board and the dash are of aluminum and are connected by cast aluminum brackets.

Details of the rear engine bearing, clutch and gearset are given in an accompanying sectional drawing. It will be noted that the flywheel is attached by taper, key and nut to the rear end of the crankshaft. A small casting fitting over this nut carries the ball pilot bearing for the clutch, which latter is of the single plate dry type, with facings of Ferodo. The driven member of the clutch is so light that no clutch brake is considered necessary. The clutch is held in engagement by six helical springs which act directly upon the pressure plate and are recessed into a casting bolted to the flywheel. Ball ended disengaging levers, pivoted on the clutch cover, serve to decrease the pressure required on the throwout bearing which, it will be noted, is a combined radial and thrust type.

The gearset is mounted as a unit with the engine and has four forward speeds and reverse. Cylindrical type roller bearings are used in this unit, in all places except the reverse pinion, which is fitted with a plain bushing.

The three shifter bars are locked in position by spring loaded balls, a design not much used in the heavier German passenger cars. An oil filler cap is provided on the right side of



Steering gear used on Priamus chassis is pivoted on dash with the bracket for the steering gear crank separately mounted on the frame. Note ball-ended connecting rod between crank and nut socket

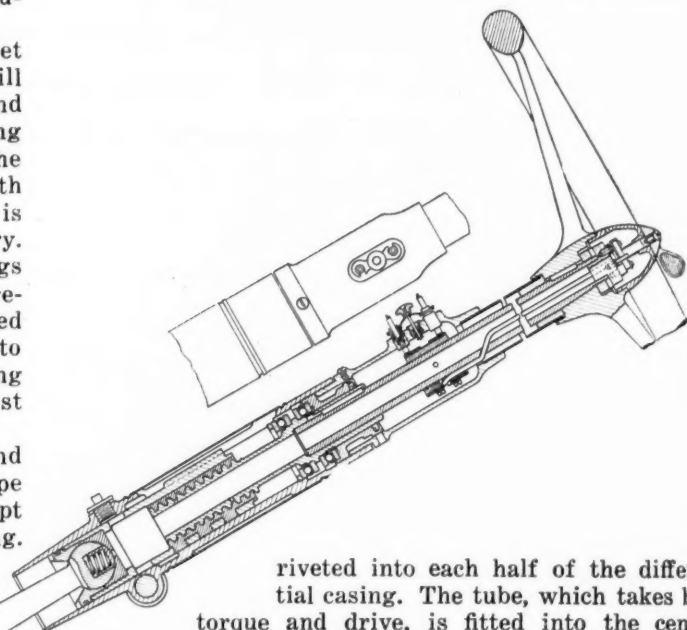
the gearset case. Control is by a centrally mounted hand lever with a ball mounting, which is unusual in German practice. The control lever is hollow and contains a latch rod terminating in a finger which must be raised when a shift into reverse is required.

The propeller shaft is divided into two portions, first to facilitate dismantling of the gearset, and second to enable use of a construction in which the torque tube is used to transmit the driving thrust to a cross member of the frame. This also reduces the length of the propeller shaft and consequently makes whipping less likely to occur, this being especially important because of the use of a rather high speed engine.

A flexible type universal is mounted directly back of

the gearset and is connected by a short shaft to an enclosed and well-lubricated metal joint inside the spherical end of the torque tube. The speedometer is driven off the forward end of the propeller shaft through gearing, as shown in one of the accompanying sectional drawings.

A semi-floating rear axle, similar in many respects to the continental design, is employed. The main housing is a steel casting, divided in a vertical plane on the fore and aft axis of the car. Axle tubes of drawn steel are



riveted into each half of the differential casing. The tube, which takes both torque and drive, is fitted into the central housing in the manner shown in the drawing.

There are two annular ball bearings on the propeller shaft at its forward end, and the pinion at the rear end is fastened to the shaft on a taper with the key and nut. Two ball thrust bearings take the thrust load of the pinion while the radial load is carried by one ball bearing and one roller bearing with cylindrical rollers. Final drive is through helical bevel gears. There is a ball thrust and a radial ball bearing each side of the differential, which is of the Dorr Miller ball type.

Hub Made Flush with Wheel

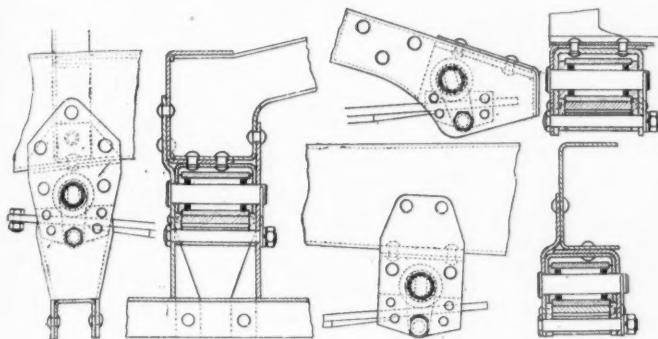
Rear wheel bearings are barrel roller type. It is interesting to note that no nut is employed at the outer end of the live axle, owing to the use of a reverse taper and a threaded locking collar inside the bearing. This makes possible the use of a hub construction which is practically flush with the disk of the wheel. Only the nuts which hold the disk wheel in position project beyond the face of the disk.

Both foot and hand brakes are of the external expanding variety. They are arranged side by side in the cast brake drum and are operated by toggle mechanisms from a concentric shaft tube as shown in the drawing. A spring between the brake shafts at the center of the axle is arranged to prevent rattle. Convenient hand adjusting nuts for both sets of brakes are placed at points adjacent to the gearset and both sets of brakes are equalized.

The hand brake lever is carried on a short stationary shaft inserted in a socket on the gearset, and the lower end of the lever swings across a toothed segment, attached to the side of the gearset. A stud attached to the lever and formed to fit the teeth in the segment is held in contact with the latter by a heavy wire spring. The details of this construction can be seen by reference to the drawings of the gearset. It will be noted that no

loose pawl with the usual thumb latch is required, since the brake lever has a compound motion and can be disengaged from the segment by transverse pressure.

Of particular interest are the design and method of mounting of the steering gear. As will be seen by the photograph and the accompanying drawing, the column which carries the screw and nut is pivoted to the dash while the upper end of the column is carried in a fitting on the instrument board so arranged as to enable a change



Details of roller brackets used in place of spring shackles. At left, front bracket of rear spring; above at right, rear bracket of rear spring; below at right, rear bracket of front spring

in inclination of the column, to suit the driver. A hardened steel screw, carried on the shaft to which the steering wheel is connected, fits into a bronze nut with babbitted surface in contact with the screw. This is a non-adjustable arrangement, but, because of the large bearing surface of the thread, it should not require adjustment during the life of the car. Thrust on the screw is taken by two thrust type ball bearings, one fitted on each side of a flange attached to the screw.

Instead of carrying the cranked steering arm in the same housing with the screw, the crank arm is separately mounted in a bracket attached to the top of the frame, as will be seen in the drawing of this part. It will be noted that the lower end of the nut is in effect is a piston to which is attached a connecting rod with spherical end. The upper end of this rod fits into a socket formed in the lower end of the nut which is made oil tight by a packing ring. Owing to the use of this construction the rod is free to move through a considerable angle in relation to the axis of the nut.

The connecting rod between the nut and the steering crankarm is made in two pieces, screwed together and provided with a substantial lock nut. This permits of variation in length and also enables the lower half of the ball socket to slip over the shank of the rod. The lower half of the rod is fitted with a barrel type roller bearing, attached to the short arm of the steering crank. The crank is carried in a bracket with bushings at each end so that the steering arm, which is attached by keys to the central tapered portion of the shaft, is not overhung as in most constructions. This design is said to result in exceptionally easy steering and in freedom from backlash.

Controls for spark and throttle are not mounted on the steering wheel as in most constructions. The throttle is operated by pedal, but a fine adjustment lever is provided on the instrument board. The ignition control is automatic for the first 18 deg. of advance, but a hand control also arranged on the instrument board is provided to give an additional 18 deg.

Centrally located in the steering wheel is a small lever switch controlling the electrically operated Bosch horn. Turning this lever to the left results in a loud tone and

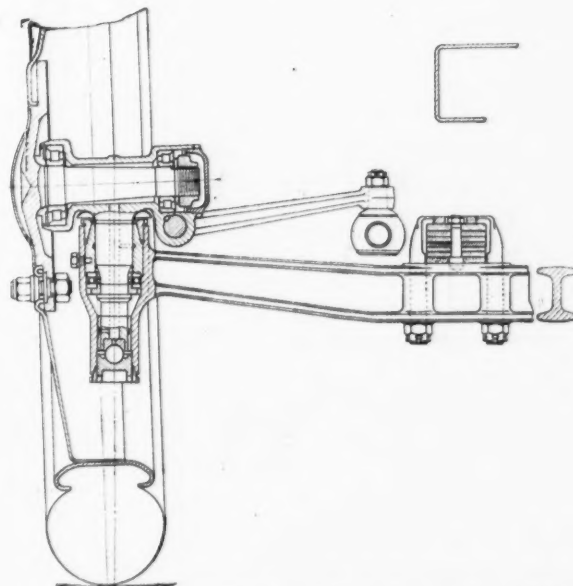
to the right in a lower tone, intended for use in town traffic. A suitable armature with a connection carried to the binding posts on the side of the steering column is provided for carrying the horn current through to the switch on the steering wheel.

Another feature of particular interest is the type of front axle and knuckle pivot employed. The axle center is of I-section and is provided at each end with a socket arranged to receive the knuckle pivot and its bearings and forming cells which hold lubricant for the knuckle pivot bearings. The knuckle itself is a T-shaped forging, the transverse member of which is made hollow to receive the live wheel spindle and its roller bearings. These are of the cylindrical roller type, but are apparently depended upon to take such thrust as may be imposed upon the spindle. The latter is somewhat inclined and, owing to the form and arrangement of the disk wheels, the knuckle pivot lies substantially in the central plane of the wheel and in such position that its projected axis meets the ground in the central point of tire contact, an arrangement which has obvious advantages.

Thrust Bearings Adjustable Axially

Each knuckle spindle is provided with an upper and a lower bushing and with two thrust bearings, one of the ordinary ball thrust type and the other a single ball of large diameter, fitting into a spherical socket. Both of the thrust bearings are adjustable axially along the knuckle pivots.

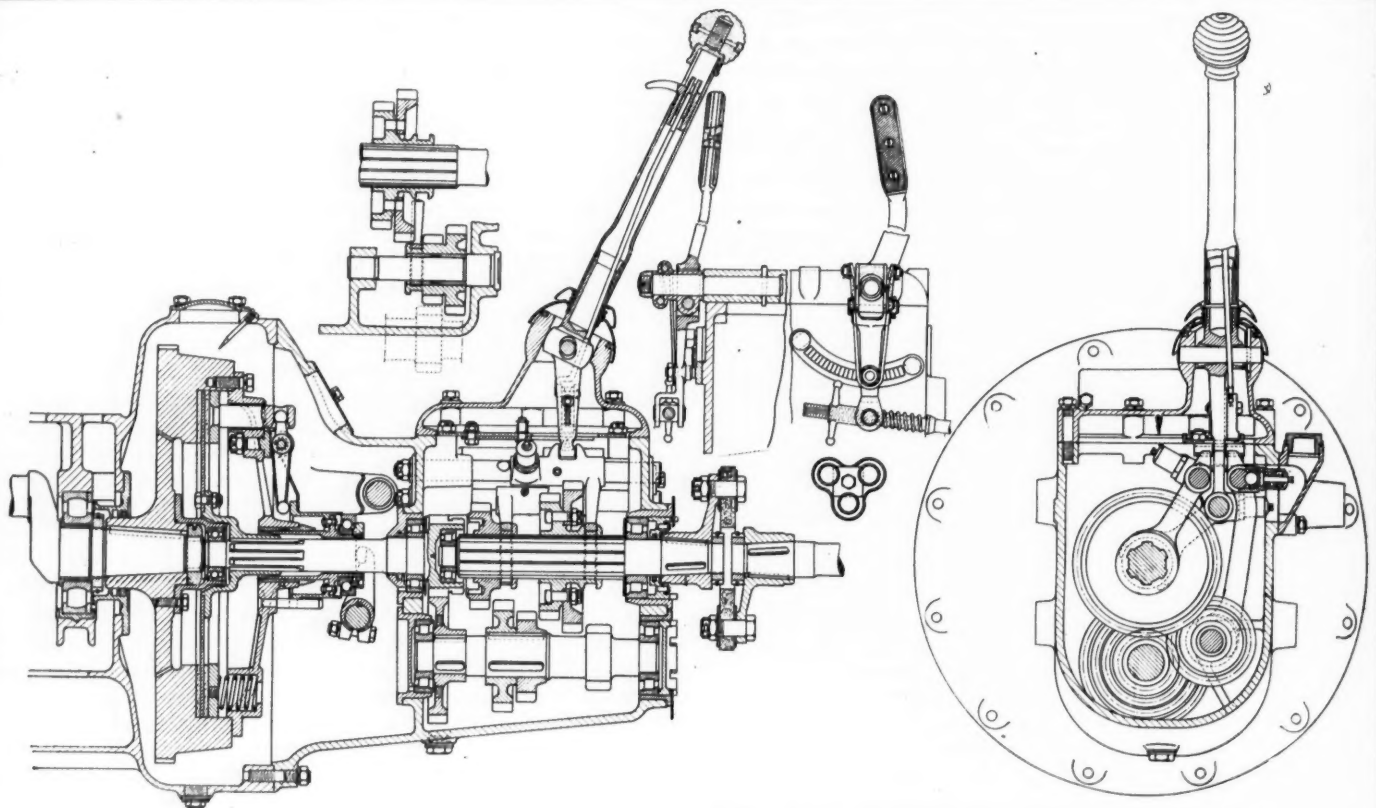
The front wheel spindles are made integral with the flanged hub to which the disk wheel is attached by bolts. Front and rear wheels are interchangeable. The wheel spindles are held in position by a nut at the inner end of the spindle and the latter is inclosed by a cap which makes an oil tight unit. Oil from the space around the spindle can flow into the knuckle pivot, the casing for which is substantially oil tight. The construction appears to be not only novel, but to include numerous ad-



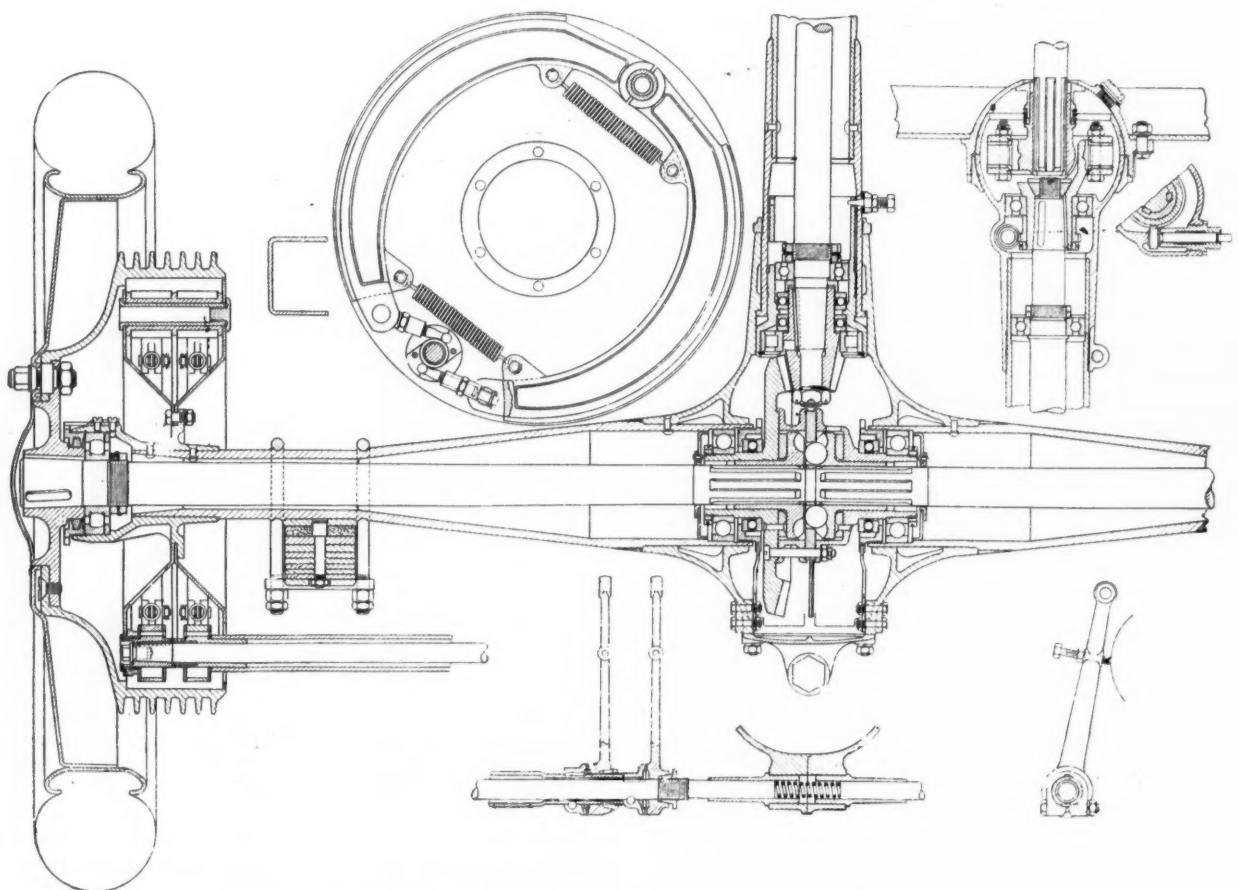
Priamus front axle showing novel arrangement of live axle spindle and the knuckle pivot which is practically in central plane of wheel. Note flush hub on disk wheel

vantages, some of which are practically self-evident and others which will become more evident on study by engineers familiar with front axle design.

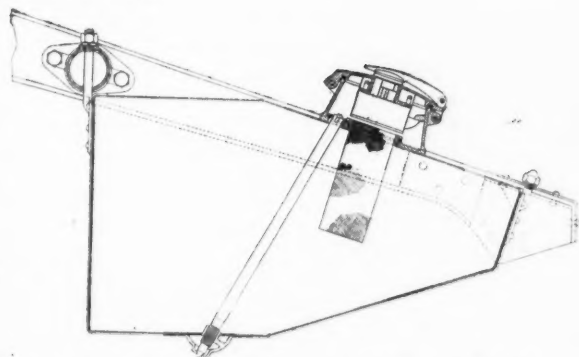
Both the front and the rear springs are semi-elliptic types and are quite long and flat. The front springs are arranged above the axle and the front ends are pivoted



Sectional views of Priamus single plate clutch and four-speed gearset. Note also details of hand brake lever without loose pawl



Rear axle, front end of torque tube and brakes used on Priamus chassis. Note reverse taper used in mounting wheels on end of live axle



Detail of locking gasoline tank filler and drain fitting operable from above

to the frame and have the usual type of grease cup. The rear ends, however, instead of being shackled are so arranged as to bear against a special roller bearing as shown in an accompanying drawing. This bearing is grease lubricated and fiber blocks are arranged to bear against the edges of the leaves and take care of any transverse thrust. Both ends of the rear spring are similarly supported, no shackles being employed. The bracket for the front end of the rear springs is attached not only to the chassis frame but to the transverse frame member above and the running board sup-

port below, as shown in one of accompanying drawings.

Frame side members are of the usual channel section and have a straight top line in side elevation except for the kicked up portion over the rear axle. The side members are convergent from the front supports of the rear springs to the dash, but are parallel throughout the remainder of their length.

A gasoline tank is supported by straps from the two rear cross members, and is placed between the side members in such a way as not to interfere with the stream lines of the body. The tank is provided with a large filler cap which has a Yale lock. A drain valve of the needle type, with its stem terminating in a slot, just below the filler cap is provided. The fuel cock under the gasoline tank opening must be opened before fuel can be drawn from the tank. This locking means is provided with a view to preventing car thefts.

Brackets for spare wheels are provided each side of the dash.

The chassis has 137-in. wheelbase, 55.2-in. track and is said to be capable of turning in a circle of 36 ft. 2 in. diameter. The chassis measures 178 in. overall, has a body space of 110.4 in. and frame width of 41.8 in. Ground clearance is 9½ in. with 120 x 135 mm. tires. The chassis is intended for a body seating six persons and is said to weigh 2320 lb. empty and 2980 lb. when ready for the road. Maximum speed is given as 59 m.p.h.

Window Regulator for Medium Priced Closed Bodies

DEVELOPMENT of a window regulator for medium priced closed bodies has been announced by the Ternstedt Manufacturing Co. This new regulator, known as Model G, has the same self-aligning lower sprocket, clutch and lift pin as found on the regular models, but the upper gear assembly is of different design. No counter-balancing spring is required and no cover plate is used. The handle fits snugly over the square spindle of the clutch and is held firmly in place by means of a screw inserted into the spindle through the handle shank.

The chain sprocket on the reverse side of the regulator

has been made smaller to enable a greater driving force to be used in raising and lowering the sash. This construction permits of using a tight fitting glass run which tends to obviate the cause of rattles.

The regulator can be located in the lock board, eliminating all need of up-build for trim purposes. The larger portion of the lock board remains intact after the recess for the regulator is made thus retaining sufficient strength.

Go and No Go Gage in Single Unit

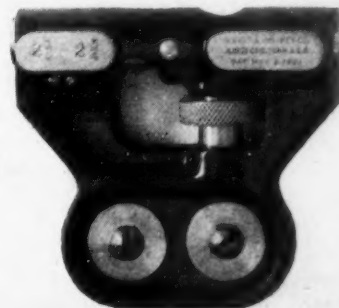
A NEW gage for internal measurements which combines a go and no go internal gage in a single unit is being manufactured by the Pratt Whitney Co.

Two spherical ended hardened steel pins are carried in a cast iron frame of non-warping construction. One pin is adjusted to any size within its range by means of opposed set screws which lock the pin firmly in position when tightened.

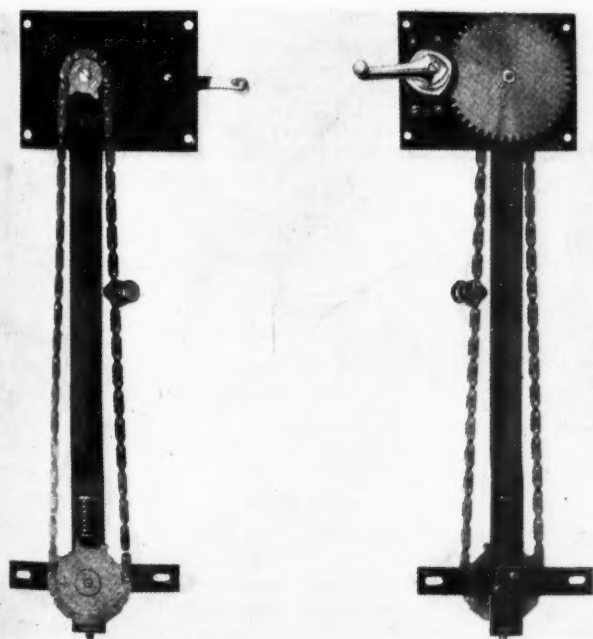
The second pin works between two stops, one of which is adjustable to give any desired limits from 0.001 to 0.025 in. This pin is instantly moved by a simple motion of the thumb and finger, inward to the go position or outward to the adjustable stop for the no go size.

All adjustments can be readily sealed to prevent tampering with the measurements. It is a simple matter to test the setting or change it to compensate for wear.

Four removable brass disks provide convenient surfaces upon which the gage limits can be marked.



Pratt & Whitney go and no go gage in single unit



Ternstedt window regulator for medium priced closed bodies

Cadillac Makes Detail Changes in Carbureter Design

Double thermostat now used to govern relief of pressure on carbureter bowl. Float valve has been redesigned to prevent sticking under adverse fuel conditions. Air pump operated by throttle and designed to assist acceleration is retained.

REVISIONS have recently been made in the Cadillac carbureter to compensate for varying temperature conditions. Instead of a single thermostat to govern the relief of pressure on the gasoline in the carbureter bowl, a double thermostat with elements functioning at different temperatures is now employed. This new arrangement greatly increases the effectiveness and range of the thermostat control. A straining device has been added and there is also a detail improvement in the fuel needle valve intended to eliminate the possibility of its sticking on its seat.

In principle and in fundamental construction, the Cadillac carbureter, which is an air valve type, has not been altered. At the time the Type 61 Cadillac car was brought out, the carbureter was fitted with two thermostats to compensate for temperature conditions. One of these thermostats, which has been retained without change in the present design, controls the tension on the auxiliary air valve spring, the tension decreasing with rising temperature. The other thermostat controlled a relief opening connected by a passage with the carbureter bowl, the object being to modify the effectiveness of the throttle pump to take care of rising temperatures. This thermostat is also retained in the present design, but is combined with the new thermostat forming a double unit.

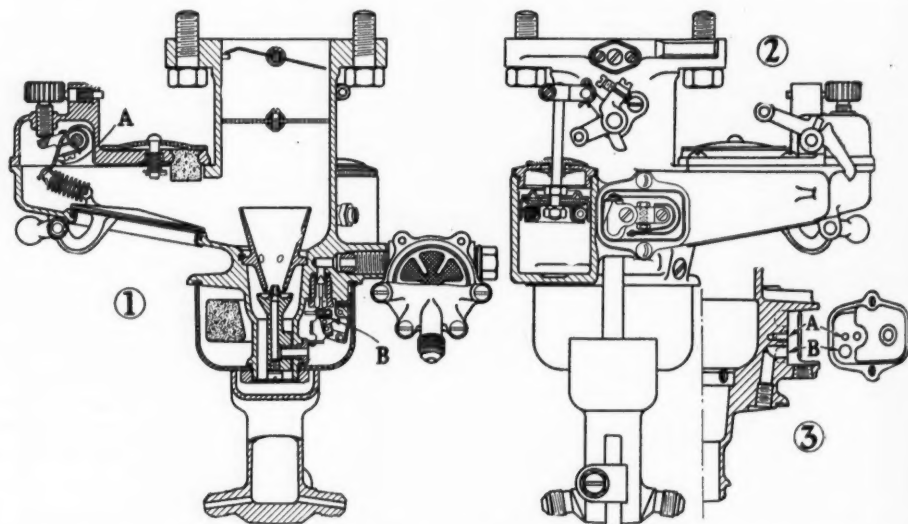
A throttle pump has for a long time been a feature of the Cadillac carbureter. The purpose of this pump is to force an additional supply of gasoline through the spraying nozzle when the throttle is opened quickly for acceleration. In the Type 61 carbureter, this pump takes the form of a plunger connected with the throttle mechanism, the chamber in which the plunger operates being connected to the upper part of the carbureter bowl. If the throttle is opened slowly, the throttle pump has little or no effect on the gasoline forced through the spraying nozzle, as a small vent which communicates with the bowl, and which is open at all times, tends to prevent compression of the air above the fuel. If the throttle is opened quickly, however, the air is compressed below the plunger and the increased pressure on the gasoline in the bowl causes more fuel to pass through the spraying nozzle.

In accelerating with the engine cold,

the throttle pump should produce its greatest effect, for, as the temperature rises, the same acceleration can be obtained with less assistance from the throttle pump. Accordingly, when a temperature of approximately 70 deg. Fahr. is reached, one of the units of the double thermostat opens a relief hole, which permits the escape of some of the air compressed by the throttle pump. Operating the throttle pump then produces less compression of the air in the bowl and less gasoline is forced through the spraying nozzle. When the temperature drops again, the relief hole is closed and the throttle pump again produces its maximum effect.

The other thermostat of the double unit, which is the new one, also opens and closes a hole leading to the carbureter bowl. The opening, however, is much larger than that controlled by the first thermostat, and the thermostat does not function until a much higher temperature is reached, about 135 deg. Fahr. The characteristics of the various fuels which are now in popular use are such that at high temperatures they have considerable vapor tension, and the resulting pressure in any closed container must be relieved. It is to relieve this excess pressure that the new thermostat has been added.

Neither of the thermostats of the double unit has any effect upon the supply of air admitted to the carbureter



1—Sectional view through latest type Cadillac carbureter showing arrangement of thermostat on air valve at A and button head on needle valve at B to give positive disengagement and freedom from sticking. 2—Section showing latest construction of throttle pump and double thermostatic control on new Cadillac carbureter. 3—Detail showing ports uncovered by double thermostat to compensate for change in temperature conditions. Ports are indicated by A and B

either through the primary or the auxiliary air inlets. The auxiliary air valve thermostat, as has already been described, governs to a certain extent the secondary air supply by varying the tension on the auxiliary air valve spring.

The arrangement for taking care of mixed fuels consists of a refined cleaning device, which not only acts as an actual dirt remover, but also breaks up the incoming fuel and removes the bubbles. Fuel enters from the source of gasoline supply through a series of different size circular screens of bronze wire mesh. These screens are not placed normal to the entering flow, but are so arranged that the fuel flow is not normal, but at an angle to the screens. After leaving the screens the gasoline enters, through staggered holes, the tube which leads to the float chamber.

The auxiliary butterfly valve, which has always been a feature of this carbureter, has been retained. It is located above the main butterfly, and is held lightly on its seat by a coil spring. The valve is unbalanced by having one side perforated with a number of small holes and the other solid, so that with this difference in area on the two sides, the suction of the engine tends to keep the valve open. In very slow heavy pulling on high gear with the throttle wide open, however, the

vacuum in the manifold is very low, and the valve tends to seat itself. Then the perforations through which the gas mixture must pass create a higher velocity at this point and assist in the mechanical breaking up of the fuel.

Furthermore, in the case of back firing the auxiliary butterfly valve seats itself, limiting the sudden rise of pressure in the carbureter. In addition to this, a relief valve just above the auxiliary air valve relieves pressure due to the back fire. This prevents building up of excess pressure in the carbureter bowl and avoids forcing the gasoline away from the spray nozzle, with consequent delay in the regular functioning of the engine.

As far as adjustments are concerned, the changes described do not entail any alterations. There is only one adjustment and this is on the auxiliary air valve spring. Once this adjustment is set it need never be touched, as the auxiliary air valve thermostat takes care of variations in the temperature. The thermostats are adjusted in manufacture at the factory, where special equipment is provided for the purpose.

The needle valve has been altered by putting a small head on the valve and positively connecting it with the float linkage, so that a drop in the float exerts a leverage on the head of the valve and positively pulls it from its seat, thus avoiding trouble from sticking.

Magnetically Controlled Tilting Mirror Used in New Lamp

A LIGHTING unit combining a double reflector with a magnetic control and a special distributing lens has recently been placed on the market by the John W. Brown Co. It is suitable for any shape of lamp case. The unit has been given the trade name, Miro-tilt. It is provided with a parabolic silvered metal reflector and a polished and ground mangan mirror. The parabolic reflector is of short focal length to give a large angle of light with a small diameter. This part of the reflector is set with a fixed tilt of $3\frac{1}{2}$ deg., illuminating the road approximately from 30 to 100 ft. ahead of the car.

Behind the parabolic reflector is the optical mirror which is magnetically controlled and is normally set so that its beam is projected substantially parallel with the horizontal. In this position it projects a shaft of light straight ahead of the car, illuminating the road for an indefinite distance. The portion of the beam nearest the car blends with the beam from the parabolic reflector so that there is no black spot between.

By means of the magnetic control unit the mirror can be deflected through an angle of $3\frac{1}{2}$ deg., projecting its beams downward in coincidence with the distributed light from the parabolic reflector. In this position it is suited to city driving and is said to accord with the usual city laws.

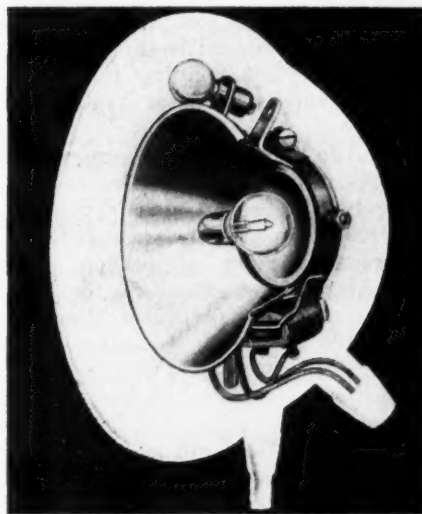
A special lens is used to distribute the beams from the two reflectors in an adequate manner. The lens is designed to provide illumination in accordance with the specifications of the Illuminating Engineering Society and also meets various State specifications. The result is accomplished by a series of vertical flutes or prisms, the center portion of which gives a spread of approximately $8\frac{1}{2}$ deg. to the beam projected by the glass mirror. This narrow beam when projected to the far position for country driving will spread across a road of ordinary width. The outer portions of the flutes give a spread of approximately 18 deg. to the beam of the metal parabolic reflector, giving a light which illuminates the sides of the road.

By the use of a standard unit the ordinary focusing means are done away with. Little or no chance for inaccuracy is possible because the bulb can be located in only one position. The socket has been specially designed to accomplish this purpose. It was found that the ordinary lamp bulb was too inaccurate for such an arrangement because of the variation in the filament. To meet this condition the National Lamp Co. has developed a new, precise, tipless, 21 cp. bulb which is now a standard product and listed as Mazda No. 1101.

An interesting point in the development of the bulb for the Miro-tilt unit is that the filament does not vary more than 0.031 of an inch from its fixed axis. The ordinary variation of the filament from the correct position

is often as great as $\frac{1}{8}$ in. A filament that is $\frac{1}{8}$ in. out of position with a parabolic reflector may throw a beam 10 ft. higher than intended at 100 ft. distance.

By standardizing the units, particularly in regard to the location of the three attaching points, it is possible to fit the Miro-tilt to any shape or size of lamp housing. The unit is the same regardless of the shape of the lamp and the diameter of the lamp face.



Standard Miro-tilt unit showing parabolic and mirror reflector and magnet location. Note dimmer bulbs above unit

Welding Aluminum in Automotive Parts Manufacture

Dependable joints are secured only by this method. Aluminum sheet less subject to corrosion and lighter than terneplate. Proper flux and careful cleaning essential to success in this process. Skilled work and correct design detail important.

By Horace C. Knerr

Chief Metallurgist, Naval Aircraft Factory

WHEN the manufacture of aluminum parts by welding was undertaken at the Naval Aircraft Factory several years ago, little practical information on the subject was available. Many problems in design and fabrication have had to be worked out by experiment and experience. The present practice, though doubtless capable of further improvement, has been adopted after much careful study in the shop, the laboratory, and the design room, supplemented by observation of the performance of parts in service over a long period.

Because of their exacting nature, the manufacture of fuel tanks for aircraft probably includes most of the important problems encountered in making other welded parts. The present paper will, therefore, be devoted mainly to tanks, and designers and manufacturers will be able to apply the principles outlined to other work.

The usefulness of aluminum for many kinds of work has depended upon the development of satisfactory methods of welding.

Aluminum can be soldered, and joints of high strength obtained, but all solders for aluminum of which we have knowledge at present deteriorate in the presence of moisture, so that the joint becomes unreliable and finally loses its strength completely. This is due to electrolytic action between the aluminum and the alloys contained in the solder. Solder is, therefore, not used with aluminum in seaplane construction. The acetylene welding of aluminum has been developed to a very satisfactory state and is described below.

The use of sheet aluminum in place of tin or terneplate, in the construction of fuel tanks for aircraft, results not only in a large saving in weight, but also in greatly increased resistance to corrosion from moisture and from fuel. One or both of these advantages, as well as some others, are gained, to a greater or less extent, in the construction of floats, pontoons, cowling, fittings and other parts of aircraft formerly made of wood, steel, brass, copper, tin, terneplate, etc. The value of the use of aluminum varies with circumstances, and must be determined for each individual case.

Aluminum alloy sheet, of the duralumin type, can be welded in the same manner as aluminum,¹ but requires heat treatment after welding, which is troublesome with tanks or similar large parts.

The greater resistance of aluminum to corrosion by

moisture, as compared with terneplate, has been demonstrated in service. Aluminum is unaffected by gasoline or benzol, even though they may contain considerable quantities of sulphur in solution. Aluminum is moderately corroded by moisture, especially salt water, but negligibly so as compared to terneplate, if the period of exposure is long. The inside of terneplate fuel tanks rusts and scales very badly after a period of service, due to the presence of condensed moisture, and possibly to impurities, such as sulphur, in the fuel. The products of corrosion become detached and clog strainers, fuel lines and carbureters. Copper is comparatively resistant to corrosion, except for a discoloration produced by sulphur, but its great weight, high cost and low tensile strength militate against its use in aircraft.

In soldering the seams of terneplate or copper tanks, drops of solder frequently fall inside. These drops are difficult to remove, and contribute to the stoppage of lines. This does not happen in the proper welding of seams in aluminum tanks. Fig. 1 shows a terneplate tank opened

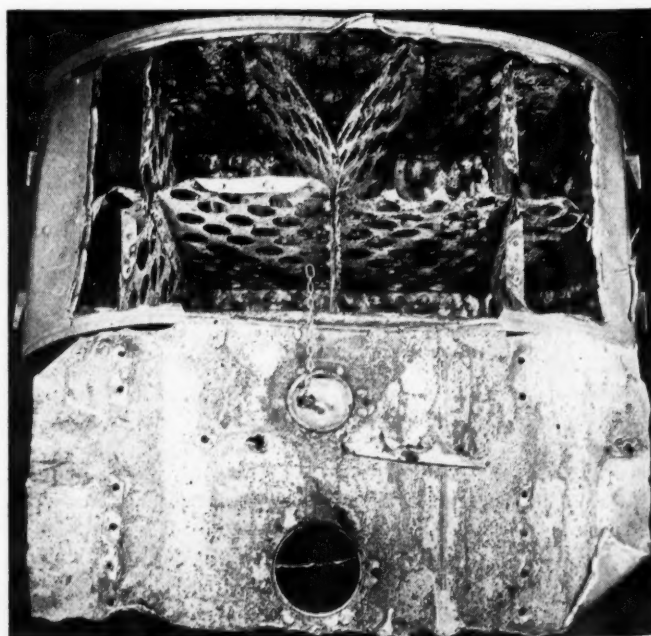


Fig. 1—Terneplate tank opened after service showing serious effect of corrosion

¹ See "Welding Duralumin," H. C. Knerr, AUTOMOTIVE INDUSTRIES, May 4, 1922.

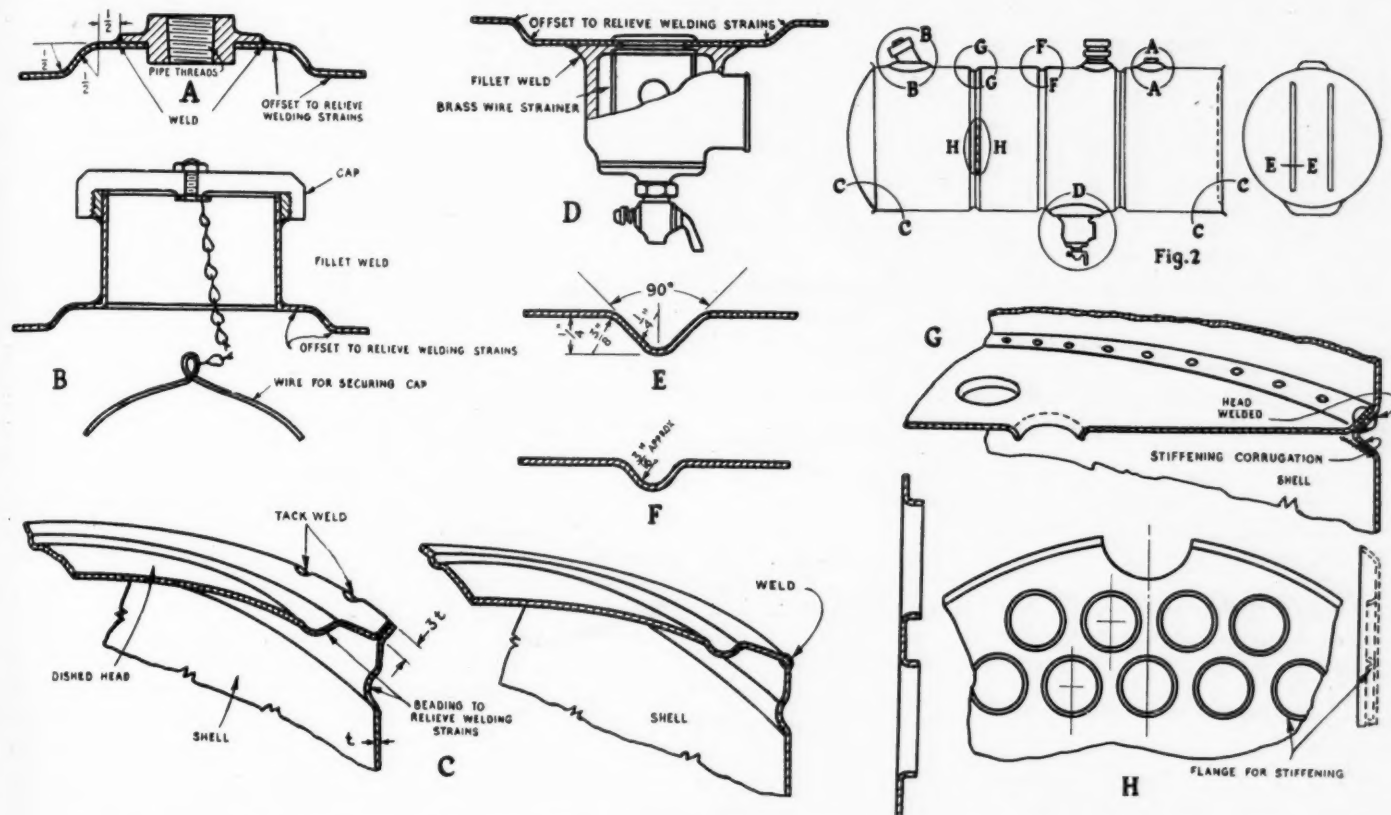


Fig. 2—Welded aluminum tank with fittings. A—Lapped flange. B—Filler detail. C—Header joint. D—Sump detail. E—Typical corrugation for stiffening shells and heads of large tanks. F—Typical groove for relieving welding strains and for stiffening shells and heads of small tanks. G—Baffle attachment. H—Typical baffle detail.

after a period of service in a seaplane, during which much trouble was experienced through the clogging of fuel lines. Much scale, rust, and solder droppings were taken from this tank.

In general, the savings in weight obtained by using aluminum for tanks in place of terneplate² is in the neighborhood of 50 per cent. Compared to copper, the saving is still greater. The thickness of No. 20 BWG, terneplate, including coating, is approximately 0.038 in., and the weight is about 1.4 lb. per sq. ft. The weight of No. 16 B&S gage (0.050 m.) aluminum is about 0.71 lb. per sq. ft., or about one-half that of the terneplate. Brass fittings are generally used with terneplate tanks, while aluminum fittings are used with aluminum tanks. The additional weight of soldered and riveted seams is considerable, while that of welded seams in aluminum is negligible.

Hydrostatic pressure tests have shown welded aluminum tanks to have a bursting strength equal to, or greater than, terneplate tanks of similar shape and capacity. A stress of over 12,000 lb. per sq. in. is developed in the aluminum before failure, rupture usually taking place in a line about an inch from the weld, where the metal was annealed by the heat of welding. Terneplate has a tensile strength of about 40,000 lb. per sq. in., but tanks give way in rivets or seams under test. Aluminum tanks are somewhat more easily damaged by rough usage than terneplate tanks, but the disadvantage is slight compared to the saving in weight.

A good grade of commercial aluminum sheet suitable for the manufacture of tanks, should analyze 98 per cent pure aluminum and should, for most purposes, be in the condition known as half hard. Test pieces cut in any direction should have a minimum tensile strength of 18,000

lb. per sq. in., with an elongation of 5 to 7 per cent in 2 in., depending on the thickness, and should stand bending, without cracking, through an angle of 180 deg. on a radius equal to the thickness of the sheet.

For purposes where deep drawing or spinning is required, as for rounded heads, etc., the sheet may be obtained in the fully annealed condition. Its tensile strength should be 12,000 lb. per sq. in., minimum, with an elongation of 20 to 30 per cent in 2 in., according to thickness. It should stand bending flat upon itself without cracking.

Because of its greater stiffness, half-hard material is more easily handled in the shop, having less tendency to bend, buckle, dent, and get out of shape. It is sufficiently ductile to permit rolling, flanging, bending, grooving, etc.

Certain lots of sheet which conformed to physical and chemical requirements, gave trouble in welding, by cracking close to the weld. The reason for this behavior was not definitely ascertained, but further difficulty has been avoided by requiring samples of the material to pass a welding test consisting in welding a disk 4 in. in diameter into a circular opening of the same size in the center of a 1-ft. square sheet.

Half-hard aluminum sheet, or aluminum sheet which has been hardened by cold working (spinning, forming, deep drawing, etc.) can be annealed by moving a gas or gasoline flame over the surface to be softened until it is just hot enough to cause a piece of paper to leave a brown mark when rubbed against the metal. Care should be taken to heat uniformly and not overheat.

Half-hard aluminum sheet can also be annealed by immersion for one minute or less in a salt bath, composed of approximately equal parts of sodium nitrate and potassium nitrate, whose temperature is 680 deg. Fahr., or by raising the temperature of the aluminum to 680 deg. Fahr. for a period of one minute in a muffle furnace. The aluminum may require more than one minute to reach

²Terneplate specifications call for the best quality soft open hearth steel, or of iron, containing not more than 0.03 per cent each of carbon, manganese and sulphur, coated with a mixture of tin and lead, containing not less than 25 per cent tin.

680 deg. Fahr. in the furnace but should not be allowed to remain at that temperature for a longer time. In either the salt bath or the furnace, the sheets should be well separated. If laid together, the outer sheets will be overheated or heated for an excessive time, before the inner sheets will have reached the proper temperature.

The minimum time and temperature which will accomplish the desired annealing should be used, as longer time and higher temperature may induce grain growth, with consequent brittleness. Material annealed in the above manner will have properties corresponding to those of commercial soft-annealed sheet.

Sheet aluminum can be formed, rolled, hammered, drawn and spun in very much the same way as copper, except that it is less ductile than the latter. Repeated annealing may be necessary if the forming operations are very severe. In spinning, plenty of power should be available. Better results are obtained by rapid working than by attempting to form the material gradually by going over it several times, as in the latter case the metal hardens and requires re-annealing. Grease or vaseline can be used as a lubricant.

Tank fittings can be cast, forged, machined from bar stock, or made up from sheet or tubing.

Cast fittings may be made of the following alloy:

Composition	Physical Properties
Aluminum (min.)..... 90	Tensile strength (min.), 18,000 lb. sq. in.
Copper7.0 to 8.5	Elongation in 2 in. (min.), 1.5 per cent
Impurities, not over..... 1.70	Specific gravity (max.), 3.0 per cent

This is similar to S. A. E. alloy No. 30.

Only high grade aluminum pig, 98 per cent pure, and sprues, gates, etc., of the same alloy should be used in making these castings. Castings of better quality than the above, such as Lynite 195, etc., are obtainable.

Cast fittings should be strictly non-porous, and may not be impregnated with any material (such as linseed oil) which would be adversely affected by moisture, by the heat of welding, or by the contents of the tank. Sound castings can be obtained only by skillful foundry practice.

The casting alloy used must be such as to weld satisfactorily to aluminum, and must not be unduly subject to corrosion, especially electrolytically in contact with aluminum.

The design of welded aluminum tanks and other parts must be specially adapted to the properties of the metal and the processes of fabrication. The same designs used in copper or terneplate tanks are seldom, if ever, applicable to aluminum, without radical changes in detail, especially at joints. The coefficient of linear thermal expansion of aluminum is 0.000013 per deg. Fahr. (about twice that of steel), the solidification shrinkage is high (about 0.2 in. per ft.), and the cast metal of the weld is hot short. Ample provision for expansion and contraction must therefore be made around all welds, to avoid warping and cracking. Where free expansion cannot take place during welding, grooves or beads must be provided adjacent to the weld, or the metal must be offset.

Care should be taken to make all bends, beads, and corrugations smooth and well rounded, avoiding sharp corners.

No rivets should be used to attach fittings. Rivets must be welded to prevent leakage, which is a troublesome operation, and after welding they are no better in ten-

sion than a welded joint, and therefore are of no particular advantage.

It is very important to avoid any points of concentrated stress or vibration in aluminum tanks, as these are likely to result in fatigue failure. Precautions must be taken to support pipe lines, etc., where they join tanks, so as to eliminate the effect of vibration. No brackets should be welded on tanks. If tanks are flat bottomed, they may rest on the floor, otherwise cradles or suspension slings should be provided to evenly distribute the load and prevent excessive pressure at any point. Slings may be of steel strap or wire. Generous felt padding should be provided in all cases. Rawhide padding should not be used, as it is likely to contain corrosive materials.

Large flat surfaces should be avoided, but where unavoidable should be stiffened by bulkheads or by corrugations. Dished heads are preferable, and can be made either by spinning or by hammering over a wooden form. Corrugations in heads, shells, baffles, and bulkheads can be rolled or pressed. In heads and shells, stiffening corrugations should project inward, leaving the outer surface flush. Cylindrical tank shells, if large, should have stiffening corrugations at intervals. These can be used also to support baffles or bulkheads.

Bulkheads or baffles in tanks are for the purpose of stiffening the walls and for preventing undue motion (swashing) of the contents. Their use and location depend upon the size, shape, position, and service of tank, and no definite rule can be laid down.

Welds which are required to be leak proof should not be made on the inside of tanks, for the reason that if a leak appears when the completed tank is tested, it cannot conveniently be repaired. Intersecting welds should be reduced to a minimum.

Aluminum and light alloys of aluminum all seize or cut when in rubbing contact with themselves. Threaded connections, valves, etc., must, therefore, be made of other metals, or at least some other material must be used in contact with the aluminum, for example, fiber caps or brass connections on aluminum threads, brass plugs or stems in aluminum valves, etc. Ordinary pipe threads are satisfactory.

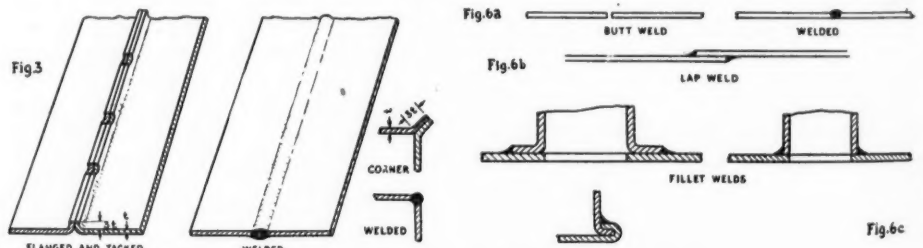


Fig. 3—Flange method of welding aluminum.
Fig. 6—*a*—Butt weld. *b*—Lap weld. *c*—Fillet welds.

The thickness of sheet used in the construction of any given tank will depend upon its size, shape, purpose, exposure to accidental damage, presence of baffles for stiffening, etc., and is best decided by the designer in each case. The following gages (B&S) are generally used: No. 14 (0.064 in.), No. 16 (0.051 in.), No. 18 (0.040 in.), and No. 20 (0.032 in.); gages 16 and 18 being the most common in tank construction. Thicknesses lighter than 20 gage are difficult to weld.

Correct execution of the various details in design has much to do with the successful production of work in the shop. Some important principles are illustrated in Figure 2. It is not, of course, assumed that all of these details will be found on any one tank. The sketch shows the various outlets located on the wall of the tank, but they

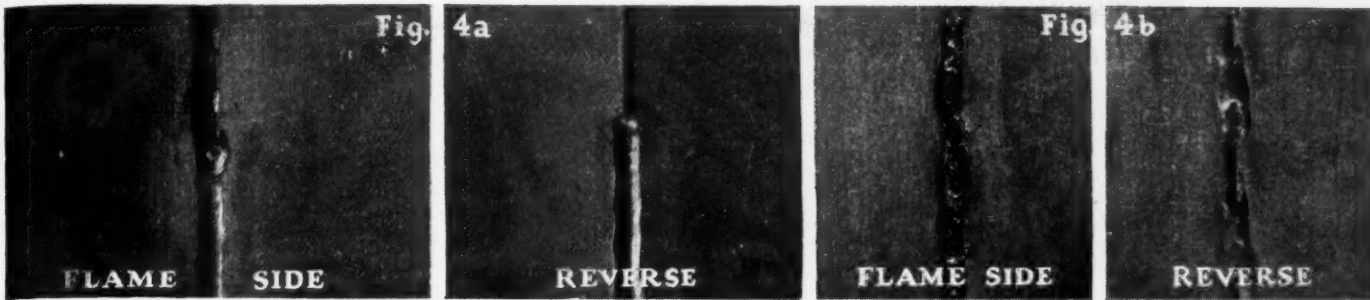


Fig. 4—*a*—Flange type of weld. Upper portion, flanged and tacked. Lower portion finished. Observe good fillet on both sides. *b*—Similar weld made with poor flux

may also be located in the heads. The same principles apply to rectangular tanks and other shapes.

The details are shown separately to a larger scale. Detail A is a pipe connection. When the available space around a tank is very restricted, the bump may be formed inward, but this must not be done at the bottom of the tank, as a large undrained area would be created.

Detail B is a filler and hand-hole, which can be oblique or perpendicular, as desired. The tubular neck can be of seamless aluminum tubing, or can be made up from sheet, by welding. The threaded portion is made from a casting or heavier tube and welded on. The cap may be of brass, fiber, bakelite composition, or other suitable material to avoid binding. These holes should be at least 3 in. inside diameter, to facilitate inspection of the inside of tank. Gage connections are similarly mounted.

Detail C shows a typical section through the joint between shell and head, illustrating the method of beading, adjacent to the weld, and of flanging up the edges for welding. In small tanks with rounded heads, the bead in the head may sometimes be omitted. After correct welding, the joint is smooth and rounded both sides.

Detail D shows the method of attaching a standard cast aluminum-alloy sump. Detail E shows the corrugation used to stiffen flat ends of tanks, and the shells of large tanks; in the latter case, often in conjunction with baffle plates. Detail F shows the bead used adjacent to welds, which may also be used for stiffening purposes in small tanks, and small baffles.

Method of Attaching Baffles

Detail G shows the method of attaching baffles. The rim of the baffle is flanged up to fit the standard corrugation, and attached by means of rivets. The latter must be welded on the outside to prevent leakage. In cases where the baffle is near enough to the end of the tank to be accessible, the baffle can sometimes be attached by tack welding to the inside of the shell, and reinforced by means of another bead, omitting the rivets. This practice presents some difficulties, and has not yet been adopted as standard.

Detail H illustrates the construction of a baffle plate. The lightening holes act also as stiffeners due to their flanged edges. The size of holes can be varied to suit the size of the tank. When the baffle is to be in a horizontal position, the flanges should be turned downward, or else an unflanged hole be provided at the center or lowest point to insure complete drainage. Baffles may also be stiffened by means of rolled corrugations.

A name plate, giving the capacity, weight, etc., of the tank should be attached by welding in an accessible location, preferably near the filler cap.

Given material of correct composition, a suitable flux, the proper oxyacetylene torch, and adequate provisions for thermal expansion and contraction of the metal, production of a satisfactory weld in aluminum depends upon the care, judgment, and skill of the operator. The requisite

skill is acquired only by practice, and even a welder who is highly skilled in the welding of steel is almost certain to get poor results from his first attempts at welding aluminum. When familiarity with the metal is acquired, work is rapid and not more difficult than with steel.

In welding aluminum, the oxyacetylene flame is commonly used. Other gases giving a flame of lower temperature can be satisfactorily used. The temperature of the oxyacetylene flame is about 6300 deg. Fahr. The melting temperature of aluminum is about 1200 deg. Fahr., and it is therefore very easy to burn the metal through if the flame is applied too long. The high thermal conductivity of aluminum causes the heat to be conducted away rapidly, which compensates to some extent for the low melting temperature. A neutral flame should be used. Either an oxydizing or reducing flame will give unsatisfactory results. Except on heavy work, a small lead-burning torch, with the smallest tip, is employed. The flame is held at an angle of about 45 deg. to the work, pointing toward the direction of progress.

Annealed aluminum wire (98 per cent pure), $\frac{1}{8}$ in. diameter, or narrow strips sheared from sheet, is used as welding rod. This is suitable for joining castings to sheet, tube, etc., as well as for joining the latter together. The casting is usually of a thicker section than the sheet or tube to which it is joined, which causes the heat to be conducted away faster and compensates to some extent for the lower melting point of the casting alloy. Should it be necessary to weld castings together, a filler rod of the same composition as the castings should be used. Such rods can be cast to a diameter of about $\frac{1}{4}$ in.

Success in welding aluminum depends, to a great extent, upon the use of a suitable flux. Several prepared fluxes are on the market, some of which are decidedly better than others. "Napolitan Flux," made by the Davis-Bournonville Co., has given very satisfactory results.

A "homemade" welding flux of the composition indicated below has been used with success. The components can be obtained from a chemical supply house, and should be in finely powdered form. They should be carefully and thoroughly mixed, and kept dry at all times. The flux is best kept in small, wide-mouth, glass bottles until ready for use, well corked to avoid absorption of moisture from the atmosphere. Welding fluxes for aluminum are, in general, hygroscopic, and very active chemically.

COMPOSITION, ALUMINUM WELDING FLUX

	Per cent
Sodium chloride	6.5
Sodium sulphate	4.0
Lithium chloride	23.5
Potassium chloride	56.0
Cryolite (aluminum-sodium-fluoride)	10.0

Diverse other formulæ given in references on welding have been tried, but were inferior to the above.

When ready to weld, a small quantity of flux is mixed

with water to a thin paste and applied to the welding rod and the surfaces to be welded, with a brush. Distilled water is best, and cleanliness is essential. Slightly heating the metal to be coated makes the flux adhere better.

In the absence of a proper flux, the molten aluminum tends to "ball up" or gather into spherical form under the flame. This is due to the formation of a coating of aluminum oxide (alumina) on the surface, which has great resistance to the flame, and prevents the molten metal from fusing together. A good flux will melt just below the melting temperature of the metal, and will dissolve this oxide coating, so that the edges join in a smooth pool under the flame, leaving a clean, sound bead as the weld progresses.

Cleaning Before Welding

If the aluminum is originally bright and free from grease, cleaning with a wire brush or steel wool immediately before welding is often sufficient. Otherwise the surfaces to be welded are cleaned by dipping in a hot soda solution for 10 to 30 seconds. The solution should be strong enough to act in this time, and renewed as needed. This is followed by rinsing in a dilute (10 per cent) solution of nitric acid, which has no effect on the aluminum but neutralizes any adhering alkaline solution and removes the dark scum left by the latter. The work is finally well rinsed in hot running water.

In joining sheet, the edges are first bent up or flanged an amount equal to about three times the thickness, as shown in Fig. 3. At corners, the flanges should bisect the angle of the joint. After cleaning, flux is applied on both sides. The edges are then held together by means of small clamps, spaced about 2 in. apart, and "tack-welded" at intervals of about 1 in. by melting the metal down at these points and "touching up" with the welding rod, if necessary. The clamps are then removed. In case the flanges have spread apart somewhat, due to the heat of the tack-welding, they should be pinched together by means of a pair of pliers. Flux is again applied where necessary and the weld is completed by melting down the flange. Little or no metal need be added from the welding rod. When started, the weld should be carried forward continuously at a uniform speed.

Fig. 4a shows the flame and reverse sides of a weld made in flat sheet by the flanging method, partly completed. The upper part of the specimen shows the weld after tacking, with clamps removed. The lower part shows the completed weld. The well filleted condition of the under side as well as the upper side of the completed weld should be noted. Fig. 4b shows the effect of using

a poor flux in making a similar weld.

A small dished tank head in process of welding to the shell by the flange method, with clamps and torch, are shown in Fig. 5.

Sheets can also be joined by means of butt welds, as indicated in Fig. 6a. The edges are slightly melted down while the joint is built up by means of filler rod. It has been found somewhat more difficult to insure a sound seam by this process, and the reverse side is not well filleted, but leaves a reentrant angle, as may be seen in Fig. 7. This may develop into a crack under repeated stress or vibration. Lap welds can be made, Fig. 6b, but are more difficult to execute than the flange weld. A good joint made by any of these methods, when tested in tension, in the original condition, not dressed, will usually break alongside of the weld where the sheet has been weakened by the heat of welding. One type of weld is, therefore, about as good as another so far as tensile strength is concerned. In other words, there is no advantage in laps or locked seams, and they are harder to make. A pronounced disadvantage is the difficulty of removing welding flux from the crevices.

In joining fittings to tanks, the fillet type of weld is generally used as in Fig. 6c. This is handled in very much the same way as a corresponding steel weld. After cleaning and applying flux, the parts are "tack-welded" together at intervals by small applications of metal from the filler rod, so as to be held firmly in place. The weld is then completed by continuous application of filler rod, until the joint is well filleted. Care is necessary to see that the weld metal is well fused with both sides of the joint, but that the sheet is not burned through.

In all aluminum welding the weld should be completed in a single continuous run, if possible. It is difficult to begin again on a weld which has set. Where it is necessary for welds to intersect, as at corners, or where a longitudinal seam joins a circumferential seam, special care and skill are required.

Welds are seldom dressed in aircraft work. The weld-metal is, in fact, merely a casting, and cannot be expected to have the same unit tensile strength as the rolled sheet. If the thickness of the weld is reduced to that of the sheet, the joint will be weakened. Hammering the joint is sometimes beneficial, but is troublesome, and has other disadvantages. Welds can be dressed where a smooth finish is more important than maximum strength.

It is of the utmost importance that all traces of welding flux be removed after welding aluminum. This flux tends to adhere to seams on both sides. It is insoluble in gasoline, and after a tank has been in service for a

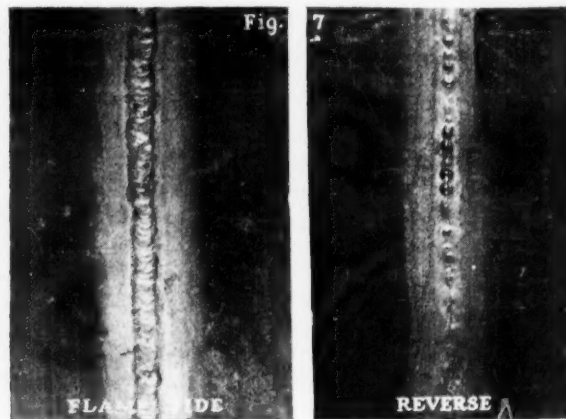
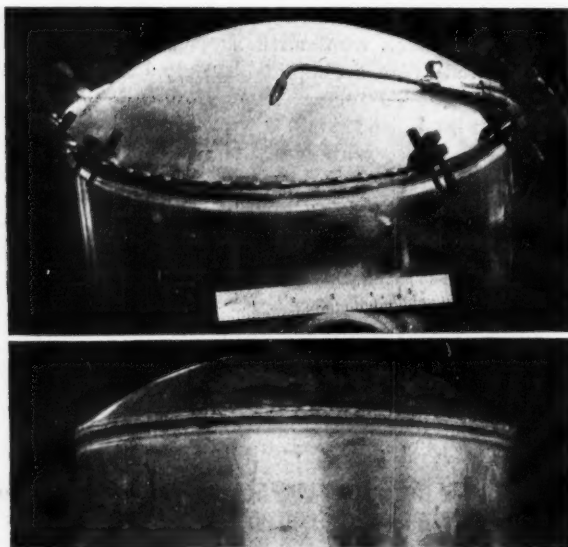


Fig. 5 (left)—Welding small dished tank head, start and finish, showing clamps and burner. Fig. 7 (above)—butt type of weld. Note poor fillet on reverse side

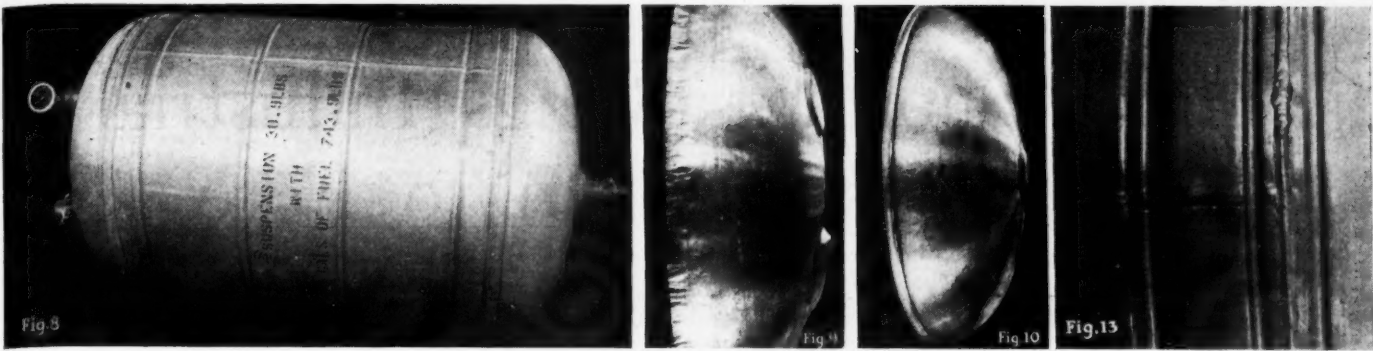
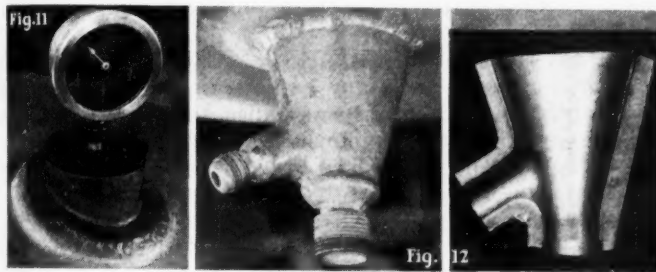


Fig. 8—Large fuel tank. Fig. 9—Top, large fuel tank. Fig. 10—Bottom, large fuel tank. Fig. 13—Close view of welds in head and shell; beads and corrugations rolled in shell after welding

time, the flux will become loosened and fall to the bottom of the tank in the form of white flakes or powder. From there it will get into pipe lines, strainers, valves and carbureters. The presence of flux also causes severe corrosion.

Where the work is accessible, flux can be removed by means of a scrubbing brush and hot water, followed by thorough rinsing in running hot water. Hot water dis-



At left, Fig. 11—Cast aluminum gage fitting welded in head of tank. Center, Fig. 12—Sump fitting. Shell made from sheet, threaded connections from bar stock. Blank stamping for shell shown at right

solves the flux slowly and requires mechanical action or a long exposure to insure complete removal.

Inaccessible surfaces can be cleansed of flux by treatment with a dilute solution (about 10 per cent) of either sulphuric or nitric acid. Tanks can be completely filled with the solution and allowed to stand for one-half hour, followed by thorough rinsing with fresh water, to remove all traces of acid. The acid should be renewed after a number of treatments. Fittings and other parts should be immersed for one-half hour in a bath of the acid contained in a stoneware tank, or a wooden one lined with lead or asphaltum paint. Thorough rinsing after treatment is extremely important.

Care should be taken to submerge parts completely in the acid bath, or in the case of tanks, to fill them and eliminate air pockets, as contact with air may cause pitting. In treating tanks, a vent or filler hole should be at the highest point. No parts or fittings of other metal than aluminum should be in contact with the work while in the acid bath, as this is likely to cause pitting of the aluminum, or damage to the other metal.

The tanks are tested under air pressure in water, and inspected for bubbles. Leaks can be touched up by welding (not soldered).

Parts are finally brightened by a quick wash in the hot caustic solution (10 to 30 seconds), followed by a rinse with dilute nitric acid and thorough rinsing in clean running water. They should now have a clean, bright, but slightly etched surface, and are ready for the application of varnish or enamel.

Gray aircraft enamel is a good protective coating for aluminum; spar varnish is also used, and certain commercial lacquers have given promising results. Coatings are conveniently applied by means of an air brush. No coating is applied to the inside of tanks.

A good example of an aluminum fuel tank of large capacity is shown in Fig. 8. This tank, with its suspensions, weighed only 0.273 lb. per gal. capacity. The bottom of the tank was made of No. 14 B&S gage (.064 in.) sheet, and the sides and top of No. 16 gage (.051 in.). The tank stands vertically. No baffle plates were employed, but the shell was reinforced with corrugations. The tank is supported in cradles of duralumin strap, padded with felt, not shown. The top and bottom were spun over wooden forms. Fig. 9 shows the spun top before trimming the edges. The crowns for mounting the filler hole and fuel gage were formed by hammering over a wooden form, after spinning. Fig. 10 shows the bottom, after trimming and rolling in the flange, and bead for welding. Fig. 11 gives a close-up view of a cast aluminum alloy gage fitting welded to the tank.

A close-up view of the sump appears in Fig. 12. The body of the sump was made of sheet aluminum, in two halves, formed in steel blanking and forming dies, including the flanged edges for welding, as shown at the right of that picture. The threaded pipe connections for the sump were turned from aluminum bar stock.

Fig. 14 shows a rectangular tank, 25 in. long, and Fig. 15 a tank of special shape, 27 in. long. The former shows rivet heads attaching baffles inside the tank, after welding over.

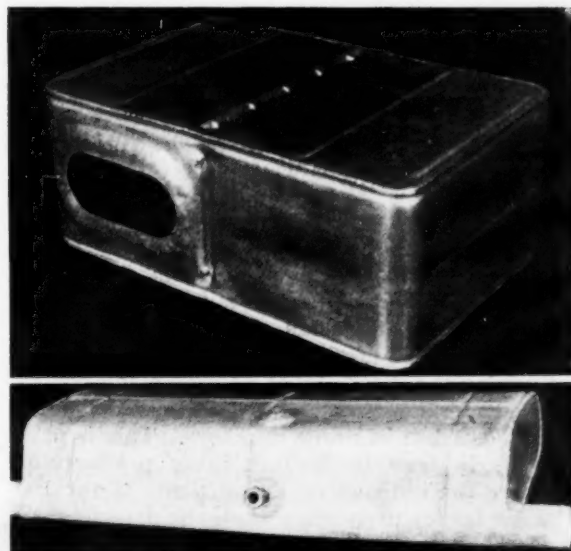


Fig. 14 (above)—Rectangular tank, 25 in. long. Fig. 15—Special shape tank, 27 in. long

Labor Shortage Brings Industrial Relations Problem to Fore

Renewal of interest dropped during period of depression seems probable. Casual study of wages not sufficient. Fundamental difficulties retard progress and affect production cost. Study of human necessities must be objective and persistent.

By Harry Tipper

THERE is evidence of distinct labor shortages in several lines of business. The most serious shortages are among the skilled workers in the metal, wood-working and building construction fields. In some factories in the machinery, die-casting and machine-casting departments, the present production is dependent upon the available skilled help and not the number of orders.

These shortages have induced some bidding for labor on premiums over the union scales by individual manufacturers who are especially anxious to take advantage of present activity.

The reductions in wages effected in 1921 and the early part of 1922 have been wiped out, in the majority of cases, with the rate of pay back again to the 1920 scale.

In building construction in the East, carpenters, brick layers and iron workers are making either just under the 1920 scale or somewhat over that scale. Of course, material prices are stiffening under these conditions, and the old "vicious circle" so frequently alluded to in 1919 and 1920 is exhibiting the same brand of viciousness if not the same degree.

These labor-rate increases or peak prices, with an actual shortage in some lines, are bound to affect the Bradstreet index, which is used as a cost-of-living basis for many of the practical and theoretical calculations.

During the labor shortages and peak prices of 1919 and 1920 manufacturers generally showed a great deal of interest in programs and systems designed to improve the industrial relations within the organizations. In many cases, interest was forced and many of the systems were equally artificial so that the depression gave all concerned a real opportunity to get rid of these excrescences.

"DIFFICULTY arises from the confusion as to the actual bearing of indirect factory costs upon the individual operation. There is little to be gained from figuring the direct labor cost of a job out to six decimal places if the indirect cost must be guessed at in round numbers. This is particularly true in modern mass production, where the indirect costs are likely to total a much larger proportion than the direct labor absorbed on the job."

Many welfare departments were eliminated and reduced to a scarcely breathing emaciation of the previous organization. Labor, industrial relations and other similar activities were dropped.

At that time, AUTOMOTIVE INDUSTRIES pointed out the absurdity of figuring on any but a temporary drop in the price of labor. Attention was called to the fact that in a century of mechanical industry, the wages had steadily gained with some very short periods of reaction during financial depressions.

Succeeding the interest in industrial relations exhibited in 1919-20, many manufacturers figured that the depression in 1921 would give them control of labor and put the worker where he belonged. The papers were full of the bold assertions of the heads of industrial concerns, with their statements of what was to happen to labor, and the equally bold rebuttal of the labor leaders.

Vicious Circle Completed

Now we are back to peak prices, labor shortage and bidding with premiums above union scale. So that in the short space of four years we have completed one swing of the circle—a vicious circle, it could be called, with some emphasis on the "vicious."

Improvements in the human efficiency, loyalty and orderly organization of the manufacturing or other establishment are not matters which will come from the casual and occasional study of strikes, labor shortages or wages as isolated problems. Only when they threaten to become critical are they visible as problems.

There are four fundamental difficulties which retard the progress of industrial efficiency from the human standpoint and affect the entire production cost.

The most important confusion arises from the general tendency to consider the wage rate as synonymous with cost and to base the entire emphasis of all consideration of this point upon the wages. We have been at pains in these articles, many times, to point out the fact that the only point of any importance to the manufacturer is the relative cost per piece in the factory. The amount earned by the worker needs consideration only where the production pace cannot be increased, production skill cannot be amplified, and there are no prospects of increasing the earnings or maintaining them without increasing the manufacturing costs.

This is not the case in the ordinary manufacturing establishment. The fact that two establishments may vary 50 per cent in the direct labor cost pertaining to a similar

item, indicates how far present practice is from any standard of cost on any given wage base.

Very little study has been given to the human necessities and, consequently, the best of present practice represents a small advance compared with the possibilities of advance.

The emphasis of discussion, private and public, should be put on the cost of production. Engineers at their gatherings should develop thoroughly the variation in direct cost obtaining in various operations with the same comparative base rate. The reasons should be thoroughly developed for these differences. They do not lie in the machine, and they do not lie in the difference of operators. The capacity of skilled mechanics in any of the industrial centers averages up much the same.

Another difficulty arises from the confusion as to the actual bearing of indirect factory costs upon the individual operation. There is very little to be gained from figuring the direct labor cost of a job out to six decimal places, if the indirect cost must be guessed at in round numbers. This is particularly true in modern mass production, where the indirect costs are likely to total a much larger proportion than the direct labor absorbed on the job.

Indirect costs have not received the attention and definition required for a proper understanding of the effect of labor variations upon the total manufacturing cost of the commodity.

The most important difficulty is the inertia existing against any painstaking study of human reactions and the effect of all these considerations on the working result. Men will patiently explore the opportunities for improvement in machinery. They will experiment and reject many times and over long periods in the endeavor to improve the mechanical or chemical processes of industry, but they are impatient of any serious and detailed study of human difficulties.

Settle Human Grievances Promptly

All human disorders of organization are trifling and apparently insignificant until they become critical, and they do not arrive at the critical stage if they receive the right kind of sane treatment in the early stages.

Like the symptoms of disease, many of which are slight in the beginning and apt to be neglected, the sore spots in organization work pass unnoticed in most factories until the gangrene sets in and cutting becomes necessary.

No array of textbooks is necessary for this study. Some of the writings are valuable and will repay the student, but there are no discovered laws, and the work of the psychologist is still too experimental to be classed with the mechanical or mathematical studies.

In human affairs, studies alone will not give capacity such as can be acquired by the constant and patient sympathy with misunderstanding and suspicion—the reasons for its existence and the way in which it can be removed from the individual worker in the organization.

Most of the men who are in charge of factories today came up through industrial operation. They were at one time thoroughly acquainted with the views, grievances, understanding and ignorance of the worker because they lived among them and doubtless shared a good many of them from time to time. They knew how much drudgery there is in the work and which job is more or less fatiguing. Their own struggles have been forgotten, for the most part, however, and when the men under them grumble or strike they have lost the capacity to visualize the reasons or the probable effectuality of the unrest.

The fourth fundamental difficulty is the tendency to keep the worker under subjection to order, if possible, without considering the wisdom of discussion and agreement on matters related to the worker's particular interests.

"THE most important confusion arises from the general tendency to consider the wage rate synonymous with cost and to base the entire emphasis of all consideration of this point upon the wages.

"The amount earned by the worker needs consideration only where the production pace cannot be increased, production skill cannot be amplified and there are no prospects of increasing the earnings or maintaining them without increasing the costs."

Coupled with that is the general tendency to operate, not primarily with the idea that the only sound cooperate bargain is a square deal, but on the basis that the interests of worker and stockholder are antagonistic.

Keeping the worker from discussion of wages, working conditions, etc., with the management, is not only theoretically poor organization, it is practically foolish.

Years ago, I remember standing in Hyde Park one Sunday morning and listening more or less inattentively to a radical anarchist discussing the police force as a symptom of coercion and an indication of government as an enemy to the people. The speaker's logic was conspicuous by its absence, but he made up for it in high-powered ranting. Several times he referred to the police as his enemies. Near the close of his remarks, some street urchins began making a lot of noise on the edge of the crowd and spoiled his speech, whereat he called upon a policeman nearby to quell the small rioters.

I am inclined to think he was friendly with the cop on his street corner. He took all his spleen out in his speaking tirades.

Give the worker an opportunity to discuss those things that are of vital interest to him and spill his grievances. You will find 90 per cent of them disappear once they are aired in full view.

Answer his questions and settle his grievances fully and squarely and he will appreciate fully the necessities of order.

It is well to remember that 90 per cent of the workers are sane, sensible citizens with a desire to do decently by themselves and they will respond practically to treatment which keeps their self-respect intact and makes their job more individual.

It is probable that the present shortage of labor will lead to a renewal of study regarding labor matters. That effect will not be of importance unless the study is more objective and persistent.

Wherever the officials of industrial organizations have studied their organizations thoroughly and with some desire for human growth, the results have shown practically in the lower labor turnover, increased efficiency and lower cost per piece of production. These are the studies that count.

PUBLICATION of its semi-annual directory and statistical record of the world's petroleum industry has recently been announced by the Oil Trade Journal, Inc., New York.

The Petroleum Register contains a very complete compilation of information concerning companies and individuals engaged in all branches of the industry as well as statistical matter. The appearance of the January number marks the change from an annual to a semi-annual basis of publication.



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Another Good Hoover Idea

SUBSTANTIAL justification can be found for the contention of Secretary Hoover that construction work for the Government should be suspended in view of the tremendous amount of private building which is being done throughout the country. He feels that to undertake now the construction program authorized by Congress would make the labor and material shortage more acute and probably increase the cost of both.

If public works, State as well as national, for which there is no pressing need, could be deferred until there is a slowing up in industry, it would cut down unemployment at a time when work will be needed. Labor now is fully employed and increased demand cannot increase production.

The Committee on Business Cycle appointed by the Unemployment Conference called by President Harding while the country was still in the dumps after

the slump of 1920, undoubtedly will indorse the position taken by Hoover and expenditure of Government funds probably will be postponed until more men are out of work. Industry just now needs all the men and materials it can get and it would be unfortunate if it had to compete, needlessly, against a fresh demand for steel and other materials as well as labor.

Export Outlook Is Bright

MANY foreign countries are just now entering the "period of greater prosperity" which reached the United States in 1922 and which is rapidly approaching a peak here. The enlarging demand for raw materials of practically every sort, which has rapidly forced up the prices of cotton, sugar, copper, petroleum and, more gradually wheat, corn and other products, is now being reflected in increased agricultural, mining and industrial activities in nearly every foreign country except those of Central and Eastern Europe.

It is undeniable that much wealth is now being created in those countries and that the increasing export demands for automobiles should continue for some months to come.

Industrial Activity at Peak

WHEN the labor supply of the country is fully employed, as it is now, the limit of industrial activity has been reached, to all practical purposes. No permanent advantage accrues to any one from bidding up the price of labor beyond reasonable limits, not even to the worker himself.

Production, in the aggregate, cannot be increased by this expedient nor can it be increased by the mere use of credit. Inflation begins when production costs rise too rapidly and when credit is used for purposes indefensible on economic grounds.

When these two tendencies become general the banks are justified in taking a hand in the situation. Reserves must be safe-guarded even though bankers profit in the process.

Motor Fees for Roads

COMPILATION by the Bureau of Public Roads of motor vehicle registration fees shows a grand total of \$152,047,000, of which \$117,093,000, or 77 per cent was applicable to state road work. Gasoline taxes in 18 states provided an additional revenue of \$11,923,000, of which \$6,474,000 was available for state road work. This makes a total of \$123,567,000 from motor vehicle fees, which was turned back into road building or maintenance.

These state fees constitute only a fraction of the tax burden carried by motor vehicles, and yet they constitute 40 per cent of the total tax bill of the steam railroads, which was \$304,885,000 in 1922.

Jokers in Regulating Bills

ONE of our most respected correspondents, a resident of Indiana who is devoted to the best interests of motor vehicles, is indignant because we said in a discussion of the legislative situation in our issue of March 8, that "it must be admitted a more reasonable attitude is being displayed by the traction interests."

He insists that nothing could be farther from the truth so far as the Middle West is concerned. After going through the evidence he provides, we're quite willing to admit we don't blame him for feeling as he does.

The traction interests in Indiana, Ohio and other Midwest States are strongly entrenched and they have become astute in politics. They are none too scrupulous in their methods. They have carried on a persistent, pernicious and unfair campaign of propaganda against improved highways. They have harped so long on the theme that motor vehicles don't pay taxes commensurate with the use they get out of the highways that they have won the sympathy of a great many persons who are not familiar with all the facts. Farmers have been especially prone to lend a willing ear. Ostensibly, the traction people are standing on this platform in their legislative campaigns, battling for State regulation of motor vehicle common carriers.

The Motor Vehicle Conference Committee has decided that there should be no serious objection to such regulation, on the ground that it is bound to come sooner or later anyway, but there are two jokers in the traction campaign. One of them is in relation to fees and they are more or less in the open on that. They contend that freight and passenger carrying vehicles should pay so much per ton or passenger mile on the same basis as those carriers which use an exclusive right of way. If they are successful in this campaign it will mean that commercial vehicle carriers will be taxed off the roads. Naturally, this would cause no grief to the traction companies.

But the real joker and the one which is rousing the wrath of the motor vehicle operators to the highest pitch, is the expectation that regulatory laws can be used to prevent the operation of motor freight and passenger lines over highways which "parallel" traction lines. The electric railroad people believe that once such laws are on the books they can make it necessary even for highway transport lines now in operation to obtain

certificates of convenience and necessity before they can continue in operation.

Highway transport naturally has followed the heaviest traffic, just as the steam roads did first and then the electric carriers. Stage drivers in the old days complained because they could not compete with railroad trains which had paralleled the post roads. (Try to find an old post road that isn't paralleled by a railroad.) Then the interurban lines were developed and practically all of them followed the highways closely.

The trolley people feel that if they can make a certificate of necessity a pre-requisite for operation of commercial vehicle common carriers on highways "paralleling" their lines, they will be able to convince State regulatory bodies that such competition would be unfair and there would be no need for it anyway. They brazenly admit, however, that they don't care what is done with the roads outside their bailiwicks, in spite of the deep interest they profess in the taxpayer.

It isn't surprising that motor vehicle operators are irritated. The insolence of the railroad and traction interests in talking of highways which "parallel" steam and electric roads is enough to make any one peevish.

Highways were the original arteries of communication. The carriers, steam and electric, deliberately ran their lines parallel with them to reach the largest centers of population and to get all the business possible. In this connection we venture the prediction that motor vehicles will be running over good roads when the present traction lines are streaks of rust. The electric railway crowd knows this is true and they are fighting with their backs to the wall to stave off the evil day as long as they can.

Perhaps our correspondent is justified in his contention that the traction interests are not displaying a more reasonable attitude. It seems to depend largely on what section you're in, but we rather feel a little more tolerance is being shown. It must be remembered that motor vehicle interests haven't always been altogether unselfish.

AUTOMOTIVE INDUSTRIES long ago made the assertion that the only way to arrive at sane settlements of legislative problems was by conciliation and compromise and with due regard for the interests of the public. Economic laws and not State legislatures will determine what forms of transportation are to survive and how they can be used most efficiently.

J. D.

Willys Scores Against Bankers

Succeeds in Halting Overland Stock Sale

Court Denies Creditors' Petition to Dispose of 739,866 Shares of Common

NEW YORK, March 28—John N. Willys, for the second time within a year, has scored against banking interests, which, it is claimed, sought to wrest control of the Willys-Overland Co. from him.

This victory was achieved through the decision yesterday by Judge A. N. Hand of the Federal court, denying application of the merchandising and banking creditors of the Willys Corp. to confer upon Receiver Francis G. Gaffey authority to sell 739,866 shares of the common stock of the Willys-Overland Co., representing part of the assets of the Willys Corp. The decision was without prejudice and may be renewed after sixty days.

It was a court battle between the creditors and New York banking interests on one side, seeking to have the stock sold, and Willys-Overland and Ohio bankers on the other striving to block the effort because of the menace to the control of Willys-Overland. The stock held by the Willys Corp. constitutes about one-third of the total and while its possession now does not carry with it control of the Toledo company, yet it would after the back dividends on preferred stock have been paid.

Confidence in the immediate future of the automobile industry and the Willys-Overland Co. itself was expressed in the decision of Judge Hand, it was thought by those who watched the proceedings.

Company Makes \$1,000,000 Monthly

Willys' counsel and his Ohio bankers painted a bright picture of the present Willys-Overland situation. They declared that the company is making \$1,000,000 a month and expects to maintain this pace for the rest of the year. Commitments call for the production of 20,000 cars a month in April, May and June and the company has \$4,800,000 in cash on hand. Banking obligations amount to \$16,000,000, due next December, but it is stated that renewals of these notes can be obtained if desired. It was asserted in the arguments that the Willys-Overland stock in dispute is worth twice as much as will be needed to meet all the claims against the Willys Corp. and that if it is put on the market at the present time it would mean a loss to both companies.

Business in Brief

NEW YORK, March 29—Trade recovery continues definitely upward without signs of halting. Accompanying the swelling volume of business is a marked increase of commodity prices in general. The consuming capacity of the public is higher than at any time in more than two years. Buying by the public has forced dealers to extend their orders further into the future. In this regard a speculative note is present.

In spite of all signs pointing to fair sailing there is a growing note of caution and doubt as to whether buying will continue to be as active with prices on the increase. There are discussions relative to the possibility of reaction. A check to speculation which looms on the horizon lies in possible action by the Federal Reserve authorities who are meeting this week in Washington to discuss the situation. There is no question but that brakes can be applied when it seems necessary.

Further revisions in iron and steel prices occurred during the past week. There is a tendency on the part of the producers to hold to a conservative policy, evidently anticipating a higher wage level. Unsettled labor and material markets prevent immediate restoration of equilibrium. Premiums for advanced shipments are still in order. There is a tendency for prices to harden.

The bond market during last week showed a further decline. This movement has been characteristic for the past month. The stock market kept on an even keel but there is hesitation as to just how far advances can go. Bank clearings for the week of March 22 showed a decided gain in volume.

It was brought out that approximately \$2,000,000 is needed to raise the Willys Corp. receivership without selling the Overland stock and the report of Receiver Caffey seemed to indicate that the amount could be obtained. It is said there is about \$12,000,000 in assets in sight and that with nearly \$5,000,000 in cash in hand the receiver expects to pay creditors a substantial dividend next

(Continued on page 746)

Continued Stability Predicted by Willys

Next 90 Days, He Says, Should Determine If There Is to Be Inflation Period

By Norman G. Shidle

TOLEDO, March 27—The next ninety days will determine whether or not the automobile industry is to go through a period of inflation followed by subsequent depression, according to John N. Willys, president of the Willys-Overland Co. He thinks that the chances for continued stability are very good, however, and predicts excellent business throughout the current year. This prediction was only one of the interesting comments on affairs in the industry made by the Willys-Overland president in an interview given to AUTOMOTIVE INDUSTRIES.

"I expect to see 3,000,000 cars and trucks produced in 1923," he said. "We have already had a very heavy production during the first quarter. This should continue throughout the spring. The last half of the year probably will show a slowing up of the present rate of production growth, but nothing in the nature of a slump is to be expected. The months from July to December will yield good business for car and truck builders, despite the fact that production probably will be smaller than that of the first six months."

Higher Prices Depend on Materials

Questioned concerning the possibility of a rise in car prices, Willys stated that if material costs continue to go up, car prices will have to be raised. He does not believe there is any desire to raise prices if such action can be avoided, but considers it inevitable if manufacturers have to keep on paying more for the materials which go into the vehicles. Any increases made are not likely to be larger than is necessary to take care of actual increase in material costs, however.

Willys has very definite ideas about the dealer situation. He says emphatically that manufacturers will have to build their dealers into sound business men or go broke. The car maker who gains some immediate advantage for himself by forcing more cars on a dealer than the latter can sell is simply storing up a lot of future trouble. Reac-

(Continued on page 746)

March to Establish New Output Record

Schedules Now Being Followed
Point to Production of at
Least 285,000

NEW YORK, March 26—Major automobile producing plants during the first part of March were operating on programs 10 per cent greater than those followed last month and presented no indication that schedules would suffer any immediate curtailment.

Conservative estimates place production this month at 285,000. If the output falls below that figure it will be due to conditions not now apparent. While there is a scarcity of material with some manufacturers it does not constitute a serious deterrent, for the present at least, to sustained production and all efforts are being expended to expedite the delivery of supplies from producing areas to manufacturing centers to avoid any possible reduction of operations.

Most of the major manufacturers are operating at capacity with others moving toward top-speed production in April. Indicative of the trend toward greater output is the announcement that Ford plans shortly to reach and maintain a 6000 daily schedule, the largest that the company has yet attempted. Back orders, which likewise exist with other car makers, are largely responsible for the advance.

Delivery Question Less Serious

Both car manufacturers and dealers have been preparing the way for the big seasonal demand which is already being felt in some sections and which will gain momentum from now on. Shipments are leaving factories as fast as rail facilities can handle them or dealers can drive away cars. The question of deliveries, particularly of finished products, will be less serious as roads become more passable and boat service can be utilized.

Reports coming from the middle western States show an increased buying disposition on the part of the farmer, the demand swinging with greater force toward that territory than was anticipated. Similar conditions prevail in the agricultural district of the South where the financial position of the farmer has shown vast improvement over a year ago.

Truck building is experiencing a quickening in demand through the more encouraging attitude in farm districts and manufacturers are moving up their schedules. Although in-

There Should Be Put Into Light Car All Features That Lend to More Comfort and Convenience

By F. F. BEALL,

Vice-President and General Manager of the Gray Motor Corp.

Detroit, March 28.

WITH a decided trend toward the use of small, low priced cars for general use in the cities of the United States, every effort should be made by manufacturers to encourage this movement by building into the cars details that make for complete comfort and convenience.

People are realizing more and more all the time that there is no necessity for using large, expensive vehicles for ordinary town purposes, but that these cars might much better be kept for formal occasions and for touring. The light cars, inexpensive to operate and capable of more convenient handling in traffic and in parking, do much better work in everyday use.

The movement toward light cars is definitely marked among persons who have been users of big cars exclusively. Though in a large sense this is due to traffic and parking conditions, it is likewise due in an important degree to the improvements in small cars in the recent past, which combine riding comfort and driving convenience of the large car.

These improvements are and should be mostly in body design, making for more driving room, better controls, adjustable windows and better seating design. Persons who have become used to them in larger cars look for them, and as they find small cars that suit them in these details they buy them. Mechanical details of the car while important have come to be generally accepted.

Women drivers of small cars like the body refinements and there is an increasing market for cars which meet their tastes. Manufacturers should cultivate this business by featuring the fact that light cars are now embodying practically all big car details.

Better bodies have eliminated much of the noise and rattle frequently associated with light car consideration and have done much to bring more responsible buyers into this field. With them price is not of major importance. What they want is comfortable driving and the convenience of the light car in getting about.

With the advances in automobile engineering there is no reason why light cars should not have the modern touches of the big car. Given a certain volume of output, light cars can be built with all the refinements of the big car at very low cost and will give a higher degree of owner satisfaction than usually associated with ownership in this class.

Future conditions in the automotive industry are very favorable in my opinion for the light car maker who builds his product with greater comfort and convenience in mind. The idea has become fixed in the mind of the buying public to a large extent that driving comfort is necessarily a matter of higher priced vehicles but as recognition comes the small car will enjoy its greatest popularity.

dustrial centers continue to take much of the output with fleet operators becoming more extensive purchasers, there is a pronounced swing toward agricultural sections where conditions in the last year or so have held back sales.

With the wider use of motor buses, output of this type of vehicle is mounting. Production of rail cars is experiencing a fresh impetus through evidences that short line roads will adopt them more generally.

Parts makers are keeping pace with the general forward movement in other branches of the industry and report exceptionally good conditions both as to orders and collections. Tire plants report greater production and shipments, with inventories somewhat in excess of those of the previous months.

Stockholders' Plan Fails; Elgin Assets Will Be Sold

CHICAGO, March 28—Assets of the Elgin Motor Car Corp., which has been in bankruptcy for several months, will be sold at public auction on or shortly after April 26, according to a decision announced today by the referee in bankruptcy in charge of the case. The decision followed the failure of a plan for reorganization which was undertaken by a committee of stockholders headed by C. S. Rieman, formerly president of the company.

A hearing will be held in the United States District Court April 2 to fix definitely the time and conditions of the sale. The Elgin plant suspended manufacturing operations shortly after the appointment of a receiver last October and has been in idleness ever since that time. A move for reorganization has been pending for some time.

Mitchell Sale Waits on Creditors' Views

Negotiations with Maker of
Checker Cab May Be Con-
cluded Within Few Days

CHICAGO, March 28—Sale of the Mitchell Motors Co.'s plant and assets at Racine, Wis., negotiations for which have been in progress for a number of weeks, will be concluded within a few days, provided complete agreement among members of the creditors committee can be reached.

While it has not been officially announced, it is known that the prospective purchaser is the Checker Manufacturing Co. of New York.

Nearly a year ago the Checker company purchased from the receiver the inventory of the Commonwealth Motors Co., and rented the plant on a temporary basis from the manufacturer of taxicabs. At that time officials of the Checker company stated that they were looking for a plant in which to locate permanently.

A creditors committee headed by a Chicago banker took charge of the Mitchell company last December and since that time operations at the plant have been on a very restricted scale. For several weeks the plant has been practically at a standstill. Recently P. J. F. Batenburg resigned as chief engineer and another resignation was that of John Tainsh as general sales manager.

Denby Is Reorganized; Same Management Stays

DETROIT, March 28—Denby Motor Truck Co. has been reorganized and after April 1 will become the Denby Motor Truck Corp., with all the stock of the former company changed over to no par stock in the new company.

There will be no change in management but J. Walter Drake, chairman of the board of Hupp Motor Car Corp., and W. R. Kales, vice-president of Whitehead & Kales Co., are added to the board of directors and with Edwin Denby will be the principal stockholders. A. S. More will continue as president.

The company will make arrangements for the removal of its plant to a new location within the next few weeks and will prepare to extend its manufacturing facilities.

NEW PIERCE-ARROW DIRECTORS.

BUFFALO, March 28—Increasing the number of directors from nine to fifteen, the Pierce-Arrow Motor Car Co. has chosen G. M. Dahl, Lewis G. Harri-man, Roland L. O'Brien, Albert D. Sikes and Carlton M. Smith.

MRS. MARY FISHER DIES

DETROIT, March 23—Mrs. Mary Fisher, wife of Albert Fisher, president and general manager of the Standard

Motor Truck Co., and a pioneer of the Fisher Body Corp., died today at her home in this city following an illness of several months. Besides her husband she is survived by two daughters and four sons, the latter, Frederick, Urban, Raymond and Edwin Fisher, being prominent in the automotive industry in this city. Albert Fisher sold his interest in Fisher Body Corp. several years ago to center his activities in the truck company.

Hayes-Hunt Body Plant to Be Moved to Oakland

OAKLAND, CAL., March 28—The plant of the Hayes-Hunt Automobile Body Co. of St. Louis, recently acquired by W. C. Durant and his associates, will be moved to Oakland as soon as a building can be erected to house it, according to announcement here by Durant. A factory for the manufacture of the Flint Six also will be established in Oakland within a year, according to the same announcement.

Plans for the building for the body plant, which is to produce closed bodies for the Durant and Star cars, call for a structure of two stories, 80 x 600 feet and furnishing 100,000 sq. ft. of floor space, and employing 250 persons, says Durant's statement.

Wire Wheel Has Product for 20-Inch Base Tire

BUFFALO, March 28—A new 20 in. base House wire wheel designed for 28 x 4 straight side cord tires has been placed on the market by the Wire Wheel Corp. of America. The new tires require only 35 to 40 lb. of air pressure as compared to 55 lb. in the 30 x 3½ in. size which they replace.

The 4 in. tire also has a greater area of road contact and is better able to absorb shocks. Claims are also made for greater road traction, less skidding, less trouble driving through ruts and heavy sand, and greatly increased tire mileage. The wheels are of the triple spoke lace type.

Proposal to Raise Duty in England Is Blocked

LONDON, March 28 (by cable)—Answering the appeal of several organizations of dealers and labor bodies which appealed to Parliament for the imposition of a high rate of duty which would discriminate against American automotive products, the Chancellor of the Exchequer in the House of Commons replied that he cannot agree to make such discrimination.

CAPACITY AT HAYES WHEEL

FLINT, MICH., March 28—Hayes Wheel Co. announces that its Imperial plant here has been placed on a capacity basis and is producing about 20,000 wheels a day. Sales for February were 500,064 wheels.

Receiver of Stanley Orders Bigger Output

Company and Creditors Ask Ap-
pointment to Facilitate Ob-
taining New Money

BOSTON, March 28—Action brought by the company itself and some of its principal creditors in the Supreme Court of Massachusetts has resulted in the appointment of S. L. G. Knox as receiver for the Stanley Motor Carriage Co. of Newton, Mass. The action is declared to be friendly and the receiver has been instructed to prepare for increased production and expansion. Knox represents the First National Bank of Boston and formerly was chief engineer of the General Electric Co. No statement of assets and liabilities was filed.

President Frank Jay issued the following statement today:

The Stanley Motor Carriage Co. has just been put into the hands of S. L. G. Knox as receiver by request of the company and some of the principal creditors, in order to facilitate the introduction of new money to increase the output and carry on the business more advantageously than has been recently possible. The company has been handicapped by the lack of money due to conditions that grew out of the war. Under these conditions the receivership was decided upon and increased rate of output has already been ordered by the receiver.

Producing Three Cars Daily

Receiver Knox has taken charge of the plant at Newton and his first step was to order increased production, jumping from one car a day to three. He found more orders on hand than the company ever had before at this time of the year and he is confident that affairs will be righted very shortly.

The present capitalization is \$940,000 preferred, \$600,000 second preferred and 45,000 shares of no par common. It is intended, Jay says, to increase this capitalization in the near future.

The Stanley steamer is one of the oldest cars on the American market, having been put into production in 1898 by F. E. and F. O. Stanley, twin brothers, who formed the firm of Stanley Bros. In 1904 the company became the Stanley Motor Carriage Co. and in 1917 there was a reorganization without change of name, the Stanley brothers retiring from active participation in the affairs of the company. In 1918 Francis E. Stanley was killed in an automobile accident.

At the present time the officers of the company are: President, Frank Jay; vice-president, Prescott Warren; vice-president, C. F. Stanley; treasurer, E. M. Hallett, and secretary, W. F. Garcelon.

R. E. MORRISON INJURED

DETROIT, March 28—R. E. Morrison, vice-president of the United States Motor Truck Co., is confined to his home in Cincinnati with serious injuries suffered in a taxicab accident.

May 3 Set for Sale of Republic Truck

No Upset Price Fixed Owing to Inability of Creditors to Reach Agreement

DETROIT, March 27 — Republic Motor Truck Co., Inc., will be sold at public auction May 3 by the Security Trust Co., receiver, pursuant to an order issued in Federal Court here this week. The sale will be held by William S. Sayres, Master in Chancery, on the steps of the courthouse at Ithaca, Gratiot County.

No upset price was fixed owing to the inability of creditors to reach an agreement, and, as a result, the property will be sold at valuations fixed by bidders subject to court confirmation. Rulings on both the priorities of mortgages and of creditors' claims have been made by the Master in Chancery but exceptions have been filed to these which will be reviewed by the court within the next twenty days.

Government Taxes Due

There is also a Government claim for back taxes which has been filed and which may run as high as \$1,500,000. The receiver is of the opinion that following the sale it will be a matter of two years before the details of the receivership are finally cleared up.

The property will be divided into five pieces to suit the convenience of prospective buyers, parcel A being the real estate situated at Alma, Cleveland and St. Joseph, Mich. Parcel B includes all merchandise, parts, trucks and accounts of the company except the big account against the Republic Truck Sales Corp. Parcel C is the stock in the sales corporation; parcel D, the account against the sales corporation which totals \$3,687,766, and parcel E, the property in its entirety.

Assets of the company, as shown in the financial statement as of Sept. 28, show property accounts, \$2,010,156; mortgages receivable and miscellaneous investments, \$31,111; investment in and advances to the Republic Truck Sales Corp., \$2,430,783; current assets, \$1,610,550; deposited with trustees, \$200,000; deferred charges to future operations, \$7,323, making a total of \$6,289,929.

Liabilities Total \$5,181,861

Liabilities aggregated \$5,181,861, of which about \$3,000,000 is secured and \$2,000,000 unsecured. The excess of tangible assets over liabilities, exclusive of capital, is \$1,108,067. Notes to the financial statement show that good-will and shop rights are not included in the assets and that there is a contingent liability of about \$500,000 in respect of guarantees covering the subsidiary company's discounted paper.

The assets of the sales corporation as of Sept. 28 totaled \$2,726,459, made up almost exclusively of truck and parts in-

ROADS BUREAU DENIES "SATURATION" STORY

WASHINGTON, March 24—Denial was made today by officials of the Bureau of Public Roads that they had sponsored a story appearing in the newspapers to the effect that the saturation point in the automobile industry would be reached within two years.

The discussion of the 1922 registration figures in various states was misinterpreted, the officials explained.

ventories, notes and accounts receivable and cash. Liabilities totaled \$3,896,130 of which the principal item is \$3,532,789 due the parent company which is valued upon the books of the latter by the appraisers at \$2,430,782.

Selden Asks Creditors for Extension of Time

NEW YORK, March 26—The Selden Motor Truck Co., of Rochester, which is now a part of Industrial Motors, has asked a three-year extension of time from its bank and merchandise creditors and there is every indication that the request will be granted. The claims aggregate about \$1,500,000.

A strong New York banking house is prepared to provide new money up to \$500,000 to rehabilitate the company and establish it on a solid foundation. This will constitute a prior claim. The proposal made to creditors is that they accept ten per cent of their claims at the end of the first year, another twenty per cent at the end of the second year and the remainder at the end of the third year.

If the plan presented to creditors is accepted, it is understood there will be a reorganization of the personnel of the company and that new policies will be adopted which are expected to increase sales materially.

Joseph T. Ryerson Buys Cincinnati Iron Plant

CHICAGO, March 26—Joseph T. Ryerson & Son, Inc., with its main plant and offices in Chicago, has purchased the plant, stock and good will of the Cincinnati Iron & Steel Co., Cincinnati, thus giving it six steel-service plants, located in Chicago, St. Louis, Detroit, Buffalo, New York and Cincinnati.

The plant of the Cincinnati company occupies a full city block, with about 110,000 sq. ft. of floor space. There are about 11,000 tons of steel at the plant at present and the Ryerson company expects soon to increase this tonnage.

Lewis E. Skinner, for eighteen years with the Ryerson company, is in charge of the plant. He will be assisted by C. A. Parnell, former assistant to Arthur Allshul at the Buffalo factory.

Stratton Motors Buys All Assets of Monroe

Will Continue Manufacture of Car and Bring Out "Stratton," Under \$700 in Price

INDIANAPOLIS, March 24—Stratton Motors Corp., which was launched and incorporated here this week, has purchased all the assets of the Monroe Automobile Co. and will continue the manufacture, sale and service of the Monroe here in the "Monroe Division" of the Stratton Motors Corp.

The new company, incorporated under the new Indiana "no par value" law, has a capital of 90,000 shares of no par value common stock and \$500,000 preferred stock.

It is understood that the new company has a new small four-cylinder job to sell at a list of less than \$700 and that negotiations are under way for the purchase of one of three local plants of ample capacity where it will be manufactured. It is expected that an announcement of the consummation of negotiations for one of these plants will be made shortly.

Frank E. Stratton, President

While his name does not appear in the application for charter it is known that Frank E. Stratton will head the new company as president. A list of the permanent officers and directors is not yet obtainable. On inquiry a statement was made that all the officers and directors would be men well known in the industry and that an early announcement of the officials and directors would be made.

It has been known for some time that Stratton has been negotiating for the Monroe and since it became apparent that the deal would be successful there has been, it is said, a noticeable increase in the sale of Monroe cars, and in dealer interest, due to the possibility of acquiring a line that will also include the smaller "Stratton" at a popular price.

Announcement was made some time ago of a proposed merger of Monroe and Premier which was sponsored by Stratton. When asked about that proposition Stratton declined to discuss the Premier situation. The impression here is that the Premier plant is one of those for which Stratton Motors is negotiating, as it would be ample in size for production of a popular price four.

EXPECTS TO BUILD "VAUGHN"

GREENSBORO, N. C., March 27—E. N. Snew, general manager of the Irvine Automobile Co., Greensboro, advises that the company expects to get into production on the new "Vaughn" car at its plant here in the near future, probably in the early spring, and will likely manufacture about 150 cars during the present year. This car first was shown in 1921 but is not yet on the active market.

Maxwell Ended Year with No Bank Debts

Current Assets Show Ratio of
3.42 to 1 Compared with
Current Liabilities

DETROIT, March 26—The consolidated balance sheet of Maxwell Motor Corp. and subsidiaries as of Dec. 31, 1922 shows current assets of \$13,638,654 and current liabilities of \$3,979,030.

Other assets are listed at \$987,223; permanent assets at \$15,924,846; good will, \$25,030,296 and deferred, \$200,163. Total assets are shown as \$55,781,184.

Among current assets are listed cash, \$2,754,223; car shipments against B/L drafts, \$1,594,926; bank acceptances and certificates of deposit, \$307,331; customers' notes receivable, \$15,183; customers' and dealers' accounts, less allowance, \$276,110; due from Canadian government for duty refunds, \$90,998; inventories, \$8,599,881.

Current liabilities include notes payable, 7 per cent gold notes, series B, of Maxwell Motor Corp., due June 1, 1923, and interest accrued thereon, \$2,336,674; accounts payable, \$1,095,015; accrued interest, taxes, etc., \$252,798; dealers' and distributors' deposits, \$294,541.

Year One of Reconstruction

In his statement to stockholders, President William Robert Wilson said:

The first full year of your corporation's activities, just completed, has been one of reconstruction of Maxwell products and plants. It was not until late in December that the Maxwell, by reason of the Chalmers readjustment and the judicial proceedings in that connection, accomplished the acquisition of the Chalmers physical properties and was able thus to combine all its properties under unified direct operation.

Pending the Chalmers readjustment and receivership Chalmers operations were carried on under great difficulties and losses were unavoidable. During the year these amounted to \$1,186,603. Despite the difficulties incident to the Chalmers readjustment, which is now substantially complete, the consolidated net profit for the year was \$831,661, of which \$720,714 was carried to class B stock equity account after taking care of Chalmers reorganization expenses and adjusting Canadian exchange reserves. Operations of Maxwell Motor Corp. itself yielded a net profit of \$2,018,265 for the year.

Cash and Balances Over \$3,000,000

Cash and cash security balances at the close of the year aggregated over \$3,000,000 with no bank indebtedness and after the retirement of over \$8,000,000 of funded debts and the disbursements incidental to the acquisition of the Chalmers property. The ratio of current assets to current liabilities improved during the year to 3.42 to 1.

Your corporation by production and sale of over 55,000 cars in the calendar year 1922, attained eighth place among automobile manufacturers. Engineering development was carried steadily forward. The demand for Maxwell and Chalmers cars is reflected in the much greater number of orders on our books today than a year ago and in the steadily increasing number of dealers.

AGITATION REVIVED TO REPEAL WAR TAX

WASHINGTON, March 25—Indications that the President will ask the next Congress to revise the tax laws have revived hope among the various organizations interested in the repeal of the discriminatory excise taxes on automotive products. The organizations have asked their members to take the matter up personally with senators and congressmen in their home districts.

Excise tax receipts from the automotive industry for February nearly doubled those for the same month last year. The taxes from motor trucks amounted to \$710,017; from automobiles and accessories, \$5,886,852, and from accessories and parts, \$3,476,269.

The figures for February of 1922 were: Motor trucks, \$396,809; automobiles and motorcycles, \$2,606,408 and accessories and parts, \$2,385,356.

The condition of your corporation's plants and equipment has been greatly improved by relatively small investment, and its machinery and tooling bettered for the larger demand expected in 1923. Improvements effected during the year have been reflected in decreasing costs and operating expenses.

The accomplishments of the past year reflect credit on the personnel in the various divisions.

Strong Market All Year, Report Made to Maxwell

DETROIT, March 24—Reports received by the Maxwell Motor Corp. from representatives of all sales districts at a factory meeting this week indicate a continued strong buying market for automobiles through the year. The biggest difficulty at the present time is in getting sufficient cars from the factory, salesmen said, rather than in finding buyers.

Walter P. Chrysler, chairman of the executive committee of Maxwell, outlined the progress that has been made with Maxwell in the past two years, at a luncheon tendered him during the sessions of the meeting. Other speakers were: W. R. Wilson, president; B. E. Hutchinson, vice-president and treasurer; A. E. Barker, vice-president in charge of sales; J. J. Plath, sales director of Maxwell; J. E. Fields, sales director of Chalmers; W. J. Mattimore, advertising manager; A. T. Stanton, director of service; William Chamberlain, assistant to the vice-president, and T. F. MacManus.

NEW G. M. EXCHANGE BRANCHES

NEW YORK, March 26—General Motors Exchange Corp. has opened branches in Boston, Minneapolis and St. Louis to serve the insurance requirements of dealers in the respective territories.

5 Akron Men Chosen Goodyear Directors

Two Were Formerly on Directorate—E. G. Wilmer Reelected
Head of Company

AKRON, March 26—In accordance with terms of the recent settlement of the six suits attacking the legality of the Goodyear Tire & Rubber Co. re-financing and reorganization, three Akron men were added to the board of directors at the annual stockholders' meeting here today.

They are H. B. Manton, president of the Robinson Clay Products Co., and a brother-in-law of F. A. Seiberling, George W. Crouse, president of the Crouse Clay Products Co., and until recently a director of the Seiberling Rubber Co., and Fred M. Harpham.

Francis Seiberling and R. L. Robinson of Akron who joined stockholders in contesting the Goodyear reorganization were reelected directors. W. L. Fiske, Chicago manager for Dillon, Read & Co. of New York, was also added to the directorate.

Other directors reelected include: J. R. Nutt of Cleveland; Grayson M. P. Murphy of New York; E. G. Wilmer, G. M. Stadlerman, P. W. Litchfield, all of Akron; R. P. Schaffner of New York; A. A. Schlessinger of Milwaukee; H. H. Springfield of Chicago, and Ralph Vanvechten of Chicago.

All Goodyear officers were reelected including Wilmer, president; Stadlerman and Litchfield, vice-presidents; C. A. Stillman, secretary; P. H. Hart, treasurer, and C. H. Brooks, comptroller.

Sales by General Motors Were 55,000 Last Month

NEW YORK, March 26—General Motors units, manufacturing Buick, Cadillac, Chevrolet, Oakland and Oldsmobile cars and the G. M. C. truck, are traveling at a production pace that promises a 1923 record far in excess of the big mark hung up last year, when 456,763 cars and trucks were built.

Official production figures were announced today at General Motors headquarters which show that preliminary combined sales of American and Canadian motor vehicles for the month of February totaled 55,000. This compares with other months of 1923 and preceding years as follows:

	1922	1921
December	47,406	15,381
	1923	1922
January	49,181	16,088
February	55,000	20,869

General Motors also announced that at the end of the first quarter of 1923 it had 67,115 stockholders as compared with 65,665 in the last quarter of 1922 and 70,504 in the first quarter a year ago. Of the first quarter's total, 45,330 are holders of common stock.

Columbia Increases List; Adds Phaeton

Prices \$40 to \$70 Higher—New Four-Passenger Is \$1,095, Old Remaining at \$985

DETROIT, March 7—Effective April 1, the Columbia Motor Car Co. is increasing its prices from \$40 to \$70 and putting on the market a new phaeton to sell at \$1,095. The price on the coupe has been increased from \$1,235 to \$1,295; on the sedan from \$1,395 to \$1,465, and on the phaeton \$1,095 to \$1,135. The price of the standard, four-passenger phaeton remains at \$985.

The new touring body which is mounted on the light six chassis with the 6-Y Continental engine is an all-steel unit made by the Mullins Body Co. It has black baked enamel finish. It differs from the previous standard phaeton in that the rear seat has been widened from 43 in. to 46 in., the extra space being gained by using a deep wheel housing, whereas the standard phaeton has no wheel housing at all. It is also longer and of slightly different contour.

The car is a low hung, straight line type without top bows. The body has considerable length for the wheelbase, providing more leg room. This has been secured by a long overhang over the rear axle.

There have been some chassis modifications, particularly in the final drive. The Continental 6-Y engine remains practically unchanged, one small alteration having been made from an accessibility standpoint. This consists of putting a cover over the timing gear case in order to enable the timing chains to be held, in case of operation on the generator drive.

Formerly, the timing case was solid and the chain was inaccessible from the front end. The axles have been changed, the rear now being the Timken 5014, which has a four-pinion differential instead of the two-pinion formerly employed, and 14 in. brake drums. The gear ratio is now 5 1/10 to 1 instead of 4 5/11 to 1.

British Sunbeam Reduces Prices in This Country

NEW YORK, March 28—British Sunbeam Motors announces a substantial reduction in American prices, the biggest cut coming on the limousine-landaulet, which is dropped \$3,500. The new prices are:

	Old Price	New Price
5-pass. phaeton.....	\$9,500	\$7,000
7-pass. phaeton.....	9,950	7,500
Limousine-landaulet	12,500	9,000

OLDS FLAT RATE SCHEDULE

LANSING, MICH., March 26—A uniform schedule of flat rates has been worked out by the Olds Motor Works, which will be placed in operation

by Oldsmobile dealers throughout the country. While termed flat rates, the system operates on the maximum estimate basis, the actual charges to the customer being made according to the amount of time and materials applied to the job, not exceeding, however, the advance estimate.

Davis Producing \$1,595 Five-Passenger Brougham

RICHMOND, IND., March 26—A five-passenger brougham has been added to the line of passenger cars made by the George W. Davis Motor Car Co. It is finished in deep maroon with fenders, chassis and upper body panels in black enamel. The radiator is nickel plated and the steps and luggage rod on the rear are polished aluminum. A spare tire and Distel wheel are carried at the side and a trunk is mounted at the rear.

The body has a capacity of five passengers. The interior is upholstered in heavy brocaded beaver brown velour. The doors are 28 in. wide and the front seats tilt forward to facilitate entrance to the rear seats. The windows are operated by crank window lifts and equipment includes cowl ventilator, Motometer, etc. The chassis is the Series 70 used on the other Davis models at the present time. The price is \$1,595.

New Marmon Phaetons Now Being Produced

INDIANAPOLIS, March 28—Two new phaetons are being brought out by the Nordyke & Marmon Co., a four-passenger phaeton at \$3,185 and a four-passenger convertible phaeton at \$3,350, both mounted on the standard 132 in. wheelbase. The lines are the same except that the convertible type includes sedan sides.

Dort Revises Lists on Nearly Full Line

Both Four and Six-Cylinder Models Affected by Increases and Reductions

FLINT, MICH., March 28—The Dort Motor Car Co. has announced a revision in prices affecting both its four and six-cylinder line.

On the four-cylinder chassis, the regular roadster and phaeton have been increased \$5 and \$20 respectively, while the sport roadster and phaeton have been decreased \$35 and \$20. The Harvard sedan is listed at \$20 less than the old price.

Changes in Six Cylinder

On the six-cylinder chassis, similar changes are effective. The roadster and phaeton are increased \$20 and \$35 respectively, while the Harvard coupe and sedan are reduced \$10 and \$30.

The following list shows the old and new prices.

Four-cylinder Models	Old Price	New Price
2 pass. roadster.....	\$865	\$870
5 pass. phaeton.....	865	885
2 pass. sport roadster...	1,015	980
5 pass. sport touring....	1,015	995
2 pass. coupe (Yale)....	1,020	1,020
2 pass. coupe (Harvard)	1,145	1,145
5 pass. sedan (Yale)....	1,070	1,070
5 pass. sedan (Harvard)	1,370	1,350

Six-cylinder Models	Old Price	New Price
2 pass. roadster.....	\$990	\$1,010
5 pass. phaeton.....	990	1,025
2 pass. coupe (Yale)....	1,145	1,145
2 pass. coupe (Harvard)	1,365	1,355
5 pass. sedan (Yale)....	1,195	1,195
5 pass. sedan (Harvard)	1,495	1,465

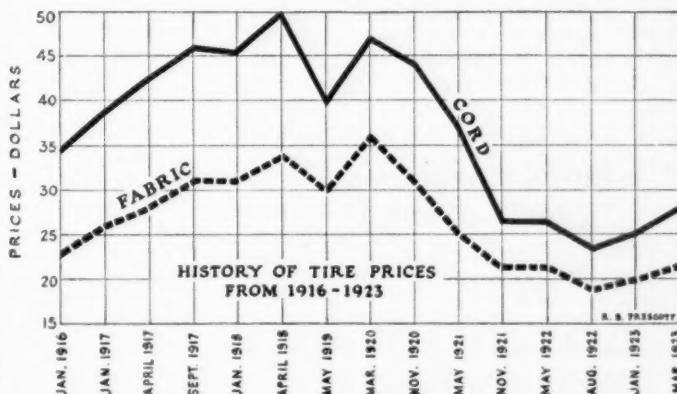
Tire Prices Now Below January, 1916, Level

NEW YORK, March 29.—Even with the March advance of 10 per cent cord tires are now 18 per cent and fabric 9 per cent below the prices of January, 1916. The accompanying chart, which is based on the average price of the 30 x 3 1/2 and 34 x 4

sizes, which are competitive and manufactured in the largest volume, shows that cords and fabrics increased 45 per cent from January, 1916, to April, 1918.

This was the peak for cords. In May, 1919, cords dropped 20 and fabrics 11 per cent. March, 1920, saw a complete recovery of both types, cords reaching a point of 36 per cent above January, 1916, or nine points below the high of April, 1918, while fabrics reached a maximum of 48 per cent above January, 1916. From this point there was a rapid decline in prices of both types until they reached a low in August, 1922. Since then there has been a gradual increase.

The present price level cannot be expected to be maintained for a long period. At the same time it is not likely that it will reach any such heights as it did during the war years.



Standard Parts Sells Spring Plants First

Those at Cleveland and Pontiac
with Service Stations Sold
for \$1,025,000

CLEVELAND, March 26—The first step to liquidate the \$20,000,000 Standard Parts Co. of this city was taken here when the Perfection Spring Co. of Cleveland and the Pontiac Spring Co. of Pontiac, Mich., were sold on a bid of \$1,025,000 to Burton A. Howe of Grand Rapids, Mich. Service stations in New York, Cleveland and Boston were included in the sale.

In addition to the purchase price, one tenth of which was paid in cash and the balance of which is to be paid in nine months, Frank A. Scott, receiver for the Standard Parts Co., will be paid \$50,000 for expenses.

Howe is a member of the securities house of Howe, Snow & Bartels of Grand Rapids, which headed a syndicate of which Otis & Co. of this city is a member.

Represents Fifty Cents on Dollar

Based on a book value, the bid for the two properties represents approximately fifty cents on the dollar. It is much higher than was set forth in the original bids that came in, one of which was for \$810,000, and another for \$850,000.

The two companies and the service stations are reported to have been substantial earners in former years and also have been operated at a profit this year. The average net earnings of this division for six years after depreciation various charges were \$590,951.

Other plants of the Standard Parts Co., the Canton Spring plant at Canton, Ohio, and the Eaton Axle, Standard Welding, American Axle, Hess Spring and Axle and the West Seventieth Street plants here, and the common stock of the Bock Bearing Co. of Toledo, are to be sold here at auction later in the week.

Creditors' Committee for Garford Dropped

LIMA, OHIO, March 27—By a formal vote as of March 30, the bank creditors' committee which has been directing the affairs of the Garford Motor Truck Co. has been discontinued. It is stated that the company has sold \$1,250,000 6 per cent first mortgage bonds and about \$2,250,000 five year 6 per cent. debentures, the proceeds of which will be used to pay the bank indebtedness. Also a line of credit aggregating \$1,000,000 has been placed at the disposal of the company.

Changes in the personnel of the com-

pany have been made by adding John Galvin, president of the Ohio Steel Foundry Co., and L. A. Larson, vice-president of the Lima Locomotive Works, to the board of directors and appointing E. R. Curtin, president of the Lima Trust Co., and E. A. Williams, Jr., president of the Garford company, as the Garford executive committee.

Peerless Earned Profit of \$1,005,112 Last Year

CLEVELAND, March 28—The Peerless Truck & Motor Co. made a profit of \$1,005,112 in 1922 as compared with a deficit of \$103,665 in 1921, according to the company's annual statement. Sales for 1922 totaled \$16,001,985 as against \$12,055,904 in 1921. Dividends in 1922 were \$625,665 and in 1921, \$413,946. During 1922, \$21,800 of 7 per cent cumulative preferred stock was retired and the funded debt was further reduced from \$2,076,400 to \$372,850. The surplus was built up to \$5,173,392.

Chevrolet in Janesville Schedules 4500 in April

JANESVILLE, WIS., March 26—Speaking before the weekly luncheon of the Lions' Club, Thomas B. Houghton, plant manager of the new Janesville works of Chevrolet, said that production is rapidly reaching the point where the new division will rank second only to the main works in Flint in point of output.

By June 1 it is expected that 300 completed cars will be turned out daily, which will represent the maximum capacity so far provided. Reviewing the history of Chevrolet, Houghton said that compared with 255,000 cars produced in 1922, the organization has for its goal an output of 450,000 cars in 1923.

The Janesville plant, which put out its first complete car on Feb. 14, was making 75 cars a day on March 15 and 100 a day on March 24, with a March output of 2500. The April schedule is 4500 cars, or 175 daily.

Dealers Gets Parts Bin Under New Paige Plans

NEW YORK, March 23—A new plan of parts merchandising was inaugurated by the Paige-Detroit Motor Car Co. this week at several meetings of dealers in eastern cities. The plan consists briefly in offering to dealers a selected stock of Paige and Jewett parts in specially designed parts bins, payment for the lot shipment being made with a cash deposit, the balance extending over a period of some months.

William DeGalen, factory service manager, has made trips to New York, Philadelphia and several other cities to introduce the plan which is meeting with much approval among the dealers.

The retail price of the parts included in the assortment is \$1,015.40 for Jewett and \$557.49 for Paige, making a total of \$1,572.89.

Mooney States Ruhr Clouds Trade Abroad

Optimism Is Felt in Some Countries, However, He Says on
Return Home

NEW YORK, March 28—The shadow of the Ruhr occupation has fallen heavily over the business world of Europe and, upon the outcome of this venture will depend much of the volume of automotive sales in that section of the world this year. Despite this condition, however, the automotive industry has experienced more of an upswing than have most other lines, particularly in the northern and Scandinavian countries, where the automobile dealers are somewhat more optimistic of the coming months than are those in other sections.

Spent Two Months on Tour

This was the opinion expressed here today by J. D. Mooney, vice-president of the General Motors Corp. and president of the General Motors Export Co., following his return yesterday on the steamer Majestic from a two months' trip to England, Holland, Denmark, Germany, Norway and Sweden. He found, on the whole, a clouded outlook, bright in some respects and less certain in others, but marked everywhere with a good deal of doubt as to what would be the ultimate result of the latest attempt to force the payment of reparations.

Concerning conditions, Mooney said:

Both the German-French and the Russian situations are dangerous and anything may come out of them. English business is somewhat improved temporarily through larger sales of coal and steel, but there is a general conflict of opinion as to what finally will happen. Automobile sales have increased somewhat in England, and this also is true for the Scandinavian countries, Copenhagen and the countries surrounding it being the brightest section that I visited.

The light car, with small horsepower rating, is being produced in large numbers in England and is finding much favor with the British public, which also is buying certain American makes in very good volume. Consequently, we anticipate that sales in England this year will develop in satisfactory accordance with our program, particularly on the two makes which we are pushing the hardest in that territory.

Little Opposition to American Car

The American car has captured the markets of the northern countries and there is very little opposition to it. Also, I believe that we need not look for serious opposition in our other export markets from the European manufacturers, most of whom are concentrating on production for the home trade rather than that overseas. American made trucks are gaining ground in all sections of Europe.

Mooney visited with Ambassador Houghton while he was in Berlin. In the same city, he met Russian business representatives who desired to open up car sales in Moscow. No definite conclusion, however, was reached.

Men of the Industry and What They Are Doing

W. A. Smith Resigns as Sales Head

W. A. Smith has resigned as vice-president and general sales manager of the Mercer Motors Co., Trenton, N. J., after 12 years' connection with that concern. The resignation is effective April 15. As yet no successor to Smith has been appointed nor has Smith announced his future plans. However, he is figuring on a connection which will keep him an active factor in the industry.

Harry T. Clinton with Hatfield

Harry T. Clinton, former general sales manager of the Fiat Co. in this country and whose connection with the industry dates back almost twenty years, has been appointed assistant general manager of the Cortland Cart & Carriage Co. of Sidney, N. Y., manufacturer of the Hatfield car. During the war Clinton acted as purchasing agent for the parent Fiat company, which was practically the Italian government because Fiat was the government's mainstay in the manufacture of munitions and other war supplies. In selling cars Clinton also has had a varied experience in both the retail and wholesale ends and his acquaintance among the dealers is nation wide.

Moon Promotes McDarby

N. E. McDarby, for the past three years advertising manager of the Moon Motor Car Co., St. Louis, has been promoted to the position of assistant sales manager. O. A. Life, for the past six years sales and advertising manager of the Multiplex Fixture Co. of St. Louis, succeeds McDarby as Moon's advertising manager. McDarby will be assistant to F. H. Rengers, general sales manager, and the two have planned an active campaign that will result in one or the other being on the road continuously, thus keeping in active touch with Moon distributors.

Pullman Appoints Thompson

The Pullman Co. announces the appointment of W. F. Thompson, an experienced automobile manufacturing man, to have full charge of the manufacturing facilities of its automobile body plant at Pullman. Thompson has been actively connected with the Peerless, Cadillac and Packard companies, and has been associated with companies manufacturing bodies for other automobiles.

Changes in Fifth Avenue Coach

Three more of the executives of the Fifth Avenue Coach Co. have joined the forces of the Yellow Coach Manufacturing Co. and the Chicago Motor Bus Co., which are headed by J. A. Ritchie and G. A. Green, both of whom are former Fifth Avenue Coach Co. officials. The three are Herbert C. Moser, for ten years superintendent of transportation; Edward Wotton, superintendent of equip-

ment for seventeen years, and William G. Reese, research engineer. Moser and Wotton will serve in the same capacities with the Chicago companies, while Reese will be identified with the Yellow Sleeve Valve Engine Co. at Moline, making Knight engines.

The vacancies in the New York company have been filled by the appointment of Joseph W. Mullahey to succeed Moser and Howard Murphy to replace Reese, with the new title of production engineer. Wotton's work has been taken over by three men—Mathew Watson, who becomes superintendent of rolling stock; Michael Forrester, superintendent of the carpentry shop, and Joseph Richardson, superintendent of the mechanical shop.

Hibbard Forms Distributorship

J. M. Hibbard, who has been president of the Automobile Crankshaft Corp. of Detroit for the last seventeen years, has organized the Hibbard-Robinson Co. in Atlanta to distribute Maxwell and Chalmers cars in that territory. While retaining his interests in the Crankshaft corporation he will sever active connection with the company to devote his full time to the Atlanta distributorship. Hibbard is also president of the Accessory Forgings Co. of Detroit and treasurer of the King Works and the Boone Manufacturing Co. of that city. L. J. Robinson, who is vice-president of the company, for several years has been a factory representative in the Atlanta territory for the Hudson Motor Car Co.

Changes at G. M. Truck

R. F. Reece, formerly a motor truck representative in Kansas City, will have charge of the order department at the factory of General Motors Truck Co., Pontiac. J. A. MacDaniels, formerly manager of the Dallas, Texas, branch, has been appointed district sales manager in that territory succeeding Pierre Schon who is taking up sales duties at the factory.

Hardy in South

A. B. C. Hardy, president of Olds Motor Works, is spending several weeks in the South.

Siegfried Convalescent

J. B. Siegfried, sales manager of the Motor Wheel Corp., is convalescent following an operation for appendicitis at the Sparrow Hospital in Lansing.

Resignation of Parill

Frank A. Parill, advertising manager of Cole Motor Car Co., who has been identified with Cole advertising for about a year, has resigned from the company. He is not yet ready to make announcement of his future plans.

Olds Advances L. G. Dodge

L. G. Dodge has been made assistant sales manager of Olds Motor Works, Lansing, in charge of the territorial organization. The change will allow Assistant Sales Manager Thomas O'Brien to devote all his time to taking charge of sales promotional and educational sales work. Dodge was formerly identified with Olds as an assistant sales manager and factory branch manager.

Campbell Wood Resigns

Campbell Wood has retired as manager of the motor equipment division of the Klaxon Co., with headquarters in Detroit. As yet he has not announced his plans for the future.

Chain Belt Elects Messinger

Clifford F. Messinger, for the last three years general sales manager of the Chain Belt Co. of Milwaukee, has been elected second vice-president of the organization. He also is a director of the company and a director of the Interstate Drop Forge Co.

Kendall Here from India

R. K. Kendall of the General Motors Export Co. and representing the G. M. C. truck in India, is visiting the factory at Pontiac. Kendall reports that the business houses in India have been able to get trucks only within the last few months. Today, he believes, motor trucks are about as common in either Bombay or Calcutta as the airplane is in the average middle western American city; in other words, they are objects of curiosity.

Elected by Engineers' Society

Eight new members, practically all identified with the automotive industries in Milwaukee, were admitted to membership in the Engineers' Society of Milwaukee at the March meeting of the executive council. They are: Lucien I. Yeomans, chief engineer A. O. Smith Corp.; G. W. Smith, chief engineer, Nash Motors Co. four-cylinder car division; Harold A. Mantz, engineer, Briggs & Stratton Co.; Oscar Frohman, chief engineer, and Emil Tranaas, engineer, Koehring Co.; Herbert L. Voigt, assistant superintendent, Geuder-Paesche & Frey Co.; William M. Bager, chief engineer, Bucyrus Co., and Carl Mitchell, chief engineer, Illinois Steel Co.

Weddington in Atlanta

J. G. Weddington has been placed in charge of the office opened by the Chase Companies, Inc., of Waterbury, Conn., in the Rhodes Building, Atlanta. He will represent both the Chase Metal Works and the Waterbury Manufacturing Co.

Indianapolis Output Far Above Last Year

Present Volume of Production Is
Expected to Be Increased
Next Month

INDIANAPOLIS, March 22—Production of motor cars in factories in this city for the month of March and for the first quarter of 1923 is far ahead of like periods for the last two years. Although the volume is expected to increase during April and May it is not probable that the present month's percentage of gain over former figures will be surpassed.

Marmon production for March is expected to reach 500 vehicles, with about 35 per cent of the units closed jobs. The factory reports that it already has orders on hand that will warrant continuing present schedules into the third quarter.

Stutz, now in the third month of producing its new six, will build at least 300 during March, and the factory hopes to reach 500 per month during April and May and to continue through the season at maximum. New dealers and increasing sales in all quarters give confidence to the expectation that demand for the new six will more than keep pace with the production advances planned at this time. The plant has been able to get into production of the new model much faster than was at first planned.

Cole "No Trade" Plan Helps Sales

Cole expects to build in excess of 300 during March, and with better receipt of material and parts during the latter part of the month, previously delayed because of rail congestion, hopes to be able to continue production at the rate of 400 to 500 per month. It is said that not only are sales increasing but that the dealers' organization is expanding and also because of the "no-trade" plan announced some time ago.

H. C. S. is not yet in production on its new six and present manufacturing is being confined to that of the four. During April a start on the six schedule will be recorded, and from then on considerable increases in the output will be made for several months.

Duesenberg with its new assembly and finish structure occupied, and with its equipment about completed, expects to increase its present schedule and to maintain a flow of output about twice the size of last year's records.

National is making fair progress in production, but plans are understood to be well in shape and almost ready for announcement that will step up production sharply.

AIR SERVICE TO NEWPORT

NEW YORK, March 26—The New York-Newport Air Service, Inc., has been incorporated by Vincent Astor, Grover Loening, Roger M. Poor, Edwin de T.

WOULD CONTROL PIPE LINES AS PRICE CURB

WASHINGTON, March 25—Senator J. W. Harreld of Oklahoma plans to introduce an amendment to the Interstate Commerce Commission Act giving the commission authority to control pipe lines as common carriers, in an effort to reduce the price of gasoline.

The Senator claims that the Standard Oil Co. practically monopolizes the distribution of oil, although the independent operators produce nearly 80 per cent of the product. He believes that his measure will have the support of Senator LaFollette, who recently conducted the inquiry into oil prices and production.

Bechtel, Charles L. Lawrence, Albert Palmer Loening and John Carrington Yates for the purpose of inaugurating week-end scheduled flights between the two cities this summer. Loening flying boats will be used and the flights will be made in 90 minutes in comparison with six and one half hours by train. Grover Loening will be in charge of the operation of the line.

Ford to Put Permanent Exhibit in Other Cities

NEW YORK, March 23—The Permanent Industrial Exhibit, which has been maintained at the New York Ford Branch, has been so successful that it will be extended to other branches in various parts of the country. It is understood that Boston and Baltimore soon will have exhibits of this character.

The exhibit consists of a number of approved appliances for use in connection with Fordson tractors and Ford trucks, and includes such devices as concrete mixers, saws, rail locomotives, dumping bodies, tank bodies, snow plows, loading and unloading machinery, etc.

This equipment is not manufactured by the Ford Motor Co. and a contract is made with the manufacturer of the equipment to defray a portion of exposition expenses. Dealers throughout the territory bring prospects to the branch when there is a possibility of selling any of this kind of equipment.

The traveling circus which covered a considerable portion of the West and some of the East last year, will be run off again this year as it was highly successful from the standpoint of sales.

BERLIET ELECTRIC TRUCK

PARIS, March 17 (by mail)—The Berliet Automobile Co., at Lyons, has gone into production on electric trucks, the first of which was shown to the public at the Samples Fair now being held in that city. The Berliet electric is equipped with Edison G-9 batteries, of 60 elements and 225 ampere-hours.

Truck Gain Notable, Bank Review States

Improvement Said to Be More
Marked Than with Car or
Parts Manufacture

MILWAUKEE, March 26—The automotive industries maintain rank as one of the high lights in the widely diversified industries of Milwaukee, according to carefully compiled statistics on employment, unfilled orders and other factors which are regularly gathered by the largest bank in the city for dissemination among its customers and the public. The latest compilation stresses the improvement being shown by the motor truck industry, which is presented as being more notable than the gain made in passenger car, unit and parts manufacture.

"Certain lines of industry which have been for a long time more or less dormant are experiencing an encouraging amount of new business. Among these are motor trucks and farm implements," the report says. "Although the farmers have not shared proportionately in the recovery of prosperity, they have reached the point where they have to have new implements."

Gain Made in Employment

Milwaukee county firms employing normally more than 500 recorded an increase of 0.9 per cent in the past 30 days. This small increase is of no significance, as the same firms made the exceptionally large gain of 4.4 per cent in the previous month. The automotive division gained 2.4 per cent. The average was reduced largely by a decline of 8.04 per cent in food products industries.

Manufacturers of automotive parts and units probably will show another marked increase in unfilled orders on April 1, compared with March 1, for shipping directions have been coming faster than they are able to make merchandise, due to the limitations of capacity and the inability to procure the skilled type of labor required for such operations.

Conservatism is Evident

Conservatism is evident in the industry, which without having the benefit of experiences in 1921, might feel justified in proceeding to make material enlargement of works. This is being done cautiously lest too much capacity be built up that would be occupied by current orders but might not be so later on. In other words, there is no disposition to pyramid capacity as was done before the big slump was encountered two years ago.

Despite adverse weather conditions, March sales in the Milwaukee buying district are expected to average up well, and unquestionably beyond the same month of 1922, which stood out as the best March in history.

Work Submits Views on Restriction Act

Goodrich Head Returns from England After Investigation of Rubber Situation

NEW YORK, March 29—B. G. Work, president of the B. F. Goodrich Co. and a member of the committee representing the Rubber Association of America in the British rubber negotiations, has returned from England and has filed a report with the Rubber association, outlining the results of his personal investigations into the workings of the Stevenson restriction act, which, it is expected, will play an important part in the future conduct of the negotiations.

Work believes that the producer is entitled to 15 per cent as a fair return on his investment, and taking that percentage, he finds that the fixed charge, before operation, works out at 13½ cents per pound of rubber to be produced and the underlying expense to be charged against every pound of rubber after the trees come into bearing and is independent of the cost of operation. The cost of operation, he finds, is 17½ cents a pound, which makes 31 cents a pound for crude rubber necessary to bring about the 15 per cent profit to the producer.

Says Act Is Misunderstood

Continuing, Work declares:

The statements made regarding export taxes have been very misleading as will be realized from the following facts.

The British Home Government imposes no tax of any kind on rubber.

The Colonial Government of the British Empire covering territories where rubber is grown have always charged an export tax since rubber was first produced. It amounts to about one and one-half cents per pound at present and is little different than it has been for many years. It is intended to cover actual expenses of supervising the industry.

The tax is paid by the exporter and not by the buyer. Under the "restriction plan" a plantation is allowed to export only a fixed percentage of what is known as its standard production at the above minimum export tax. If it desires to exceed this quota it must pay a very much higher, or practically prohibitive export tax, so we may take it for granted that the excess taxes provided for in the plan are intended only as an automatic check to prevent surplus exportation.

Rubber Will Be Forthcoming

When the world needs the rubber it will be forthcoming without any increase in the present minimum export tax. The fundamental law of supply and demand is still in force and one has but to visualize the interests of the planters to realize that the world is in no danger of a shortage of rubber nor of much higher prices until the time when the demand may exceed the supply.

The legislators of these rubber producing Colonies are very largely planters or connected with planting interests. It is not generally known, but nevertheless true, that they make the laws controlling exports and may change them at any time subject to the approval of the Foreign Office.

FREIGHT BY PLANE GAINING IN CANADA

OTTAWA, March 27—The Canadian Air Board reports that Canadian pilots flew 294,449 miles, carried 9153 passengers and handled 77,850 pounds of freight last year. Pilots remained 4347 hours in the air. Says the board:

"The trend in aviation is away from flying purely for pleasure. The tendency is toward commercial utilization of planes, evidenced by the great increase in the amount of freight handled by airplanes during the year."

Any plan to artificially regulate the price of a commodity will sooner or later run its course, but this particular one is temporarily serving a good purpose for growers and manufacturers alike.

Feiker to Assist Government

WASHINGTON, March 29—The Department of Commerce has announced that Fred M. Feiker of the McGraw-Hill Co., Inc., and formerly assistant secretary of commerce, will have charge of the organization of the staff to conduct the proposed investigation of possible sites for growing rubber, made necessary by the British restriction act.

Durant Built 100,000 Vehicles in 17 Months

NEW YORK, March 28 — Durant Motors turned out its 100,000th motor vehicle yesterday, an accomplishment achieved after seventeen months production. Inasmuch as the company is manufacturing three cars and one truck in eight different plants, it was impossible to determine which was the 100,000th vehicle, so in each plant a symbolizing car was produced in celebration of the event.

This production has been reached through the manufacture of 56,541 Durants, 42,753 Stars, 330 Locomobiles and 376 Mason Road Kings in the plants at Long Island City, Elizabeth, Leaside, Bridgeport, Flint, Lansing, Muncie and Oakland.

February Better Month with M. A. M. A. Members

NEW YORK, March 28—Even with a short month, February produced more business for the equipment makers than January, according to reports from members of the Motor and Accessory Manufacturers Association.

February sales totaled \$48,518,700 as compared with \$45,451,950 in January, while in February, 1922, these purchases only amounted to \$22,720,000.

Collections last month did not vary much from January, past due accounts figuring \$2,741,100 as compared with \$2,469,950, while February notes outstanding totaled \$1,981,950.

Fuel Chief Surveying Transport Facilities

Study Now Underway Will Cover Seven Representative Dis- tributing Centers

WASHINGTON, March 28—The study of motor transport facilities in seven representative cities was started today under the direction of F. R. Wadleigh, Federal fuel administrator. Wadleigh has appointed G. L. Pride of New York as chairman of the committee to conduct the inquiry regarding storage and distribution methods at the fuel centers.

The study will include the relative cost, etc., of distribution by the various coal distributors, particularly those using fleets of motor trucks. The findings will be submitted to the fuel administrator. The inquiry has nothing to do with legislation.

Pride has long experience in motor transport work, having owned and operated several fleets in New York City and served in an advisory capacity to the motor transport division of the army during the war. He was selected on the recommendation of the truck committee of the National Automobile Chamber of Commerce and Automotive Division of the Department of Commerce.

It is hoped to complete distribution inquiries in Detroit, Indianapolis, Chicago, Buffalo, Cleveland, Worcester, Mass., and Minneapolis. The committee has started its work in the last named city.

Personnel of Swayne Committee Announced

WASHINGTON, March 26 — Announcement of the personnel of the committee on Relation of Highways and Motor Transport to other Transport Agencies, which will study motor transportation on behalf of the Transportation Conference, was made today.

The committee, of which A. H. Swayne, vice-president of the General Motors Corp., is chairman, will meet here within a few days. Other members of the committee are as follows:

W. J. L. Banham, traffic manager, Otis Elevator Co., New York; L. W. Childress, president, Columbia Terminals Co., St. Louis; D. G. Fenner, engineer and manager Public Works Department, Mack Truck, Inc., New York; Gerret Fort, vice-president, Boston & Maine Railroad, Boston; Philip W. Gadsden, vice-president, United Gas Improvement Co., Philadelphia.

W. H. Lyford, vice-president, Chicago & Eastern Illinois Railroad, Chicago; R. M. Matthiessen, president, Motors Haulage Co., New York; John D. Miller, president, National Milk Producers Federation, Utica, N. Y.; H. H. Raymond, president, Clyde Steamship Co., New York; Arthur Waterfall, vice-president, Dodge Brothers.

Henry J. Waters, editor, Kansas City Star and formerly president of the Kansas State Agricultural College, and R. C. Wright, general traffic manager, Pennsylvania Railroad.

Continued Stability Predicted by Willys

Next 90 Days, He Says, Should
Determine If There Is to Be
Inflation Period

(Continued from page 736)

tion from such methods is bound to come. And when it does come, its effect is devastating.

The dealer is perfectly justified in conducting his sales very largely on a credit basis, Willys believes. But the manufacturer will have to do more to help the dealer finance his business than has been customary in the past. While many steps in this direction have already been taken, further developments are necessary in the future.

The Willys-Overland Co., for example, completed arrangements last November with a Toledo bank by which a fund of \$7,000,000 was made available for handling the paper of Overland and Willys-Knight dealers. It was found necessary, however, to use only \$3,500,000 of the fund at the peak of winter deliveries. The amount in use now is much less than that amount.

Overhead Must Be Kept Down

Careful business judgment is particularly needed at the present time from a manufacturing standpoint. It is the part of wisdom to keep overhead expense down to a minimum and to increase the efficiency of present facilities rather than to go forward with extensive expansion plans just now. While continued sales are in sight for some time to come, it is evident that the present rate of growth cannot continue indefinitely. Consequently, a comparatively low overhead is desirable.

In response to a question, Willys stated that he expected no developments in the labor situation. In dealing with this phase of industrial activity, he said:

Labor efficiency has increased very materially during the last two or three years. We have a lower labor cost per car in our plants than at any previous time, despite the fact that wages are high.

If general commodity prices become inflated, the rate of wages, of course, will have to be increased. If such general inflation takes place, the automotive industry as a whole will be affected just as will every other industry. The experiences of 1920 are so recent, however, that there seems to be a good chance of averting another period of inflation. The Federal Reserve Board has its hand on the throttle and will aid materially to keep industry stabilized.

Producers Buy Cautiously

Willys sees no recurrence of the 1920 inventory situation in any case, saying that every automobile manufacturer is buying cautiously with reference to immediate needs for a short time in advance.

He says further:

There is little tendency, however, to bid for either labor or materials. This is a dis-

tingly encouraging sign and will do more than anything else to avert possible inflation. Some bidding has taken place, of course, but I do not believe that it has been extended enough to have any material effect on the general situation.

Competition throughout the automotive industry is becoming keener every year. This year there were 80 manufacturers represented at the Chicago show as against 102 the year before. It seems as though a further trend in this direction cannot be avoided.

The reduction in number of manufacturers has helped to relieve the dealer situation to some extent. As companies have gone out of business, their dealers have become available for those makers who remain. The numbers added to the large dealer organizations from this source, however, are not very great, as it has been the smaller manufacturers in most cases who have passed out of the picture.

Truck Market at Base Sound

"How does the truck market look to you?" was another query.

"Fundamentally, the market for trucks is excellent," was the reply, "but the truck industry in this country has not yet recovered from the effects of the war. Truck capacity was increased very greatly in 1917 and 1918 to meet war needs.

"When the war ended facilities were available for building far more trucks than the normal market was likely to demand for some time to come. In addition, there were thousands of second-hand trucks available at very low prices. The normal curve of truck demand has not yet caught up with the producing facilities artificially developed by the war.

"I know, because I have been connected with a truck company."

Willys believes, nevertheless, that more trucks will be sold in 1923 than were marketed in 1922. He does not agree with the sentiment, prevalent in some circles, that truck sales will constitute a greater part of total motor vehicle production this year than last. He thinks that passenger car growth in 1923 will be greater proportionately than truck growth.

Foreign Outlook Spotty

Questioned about the outlook for foreign trade, Willys said:

We ought to sell more cars abroad this year than we did in 1922. Prospects for more business are very bright in certain countries and very dark in others. On the whole, however, they are favorable. Foreign trade should be conducted on sound merchandising lines, if it is to be of permanent value.

A few years ago our company, along with a lot of others, sold a great many cars to certain foreign countries. We stocked these countries up so that they couldn't absorb more cars for several years. Consequently, we didn't get any additional business for some time. Merchandising to foreign markets has to be carried out on the same basis as successful domestic selling, if the best results are to be obtained.

Then came the question, "What do you think about the decision to hold the next New York show out in a Bronx armory?"

The reply was quick and brief. "I think it is a mistake. The Armory is so far away from the center of things

Willys Wins Victory, Halts Sale of Stock

Court Denies Bankers' Petition to
Sell 739,866 Shares of
Overland

(Continued from page 736)

month, probably 10 to 20 per cent. Already creditors have received 57 per cent of their claims against the Willys Corp.

Willys was not in court himself, but his representative read a proposition that tended to show his confidence in the future of the Willys-Overland Co. Willys stated that if the sale of the disputed stock were delayed until Sept. 1 he was willing to post with the receiver \$200,000 in securities, all or part of which could be used to make up any deficiencies between what the stock would bring in September and what was needed in case the stock did not bring what it was expected to. The court, however, did not accept the offer.

Overland's Annual Report

TOLEDO, March 26—The report of the Willys-Overland Co. for the year 1922 shows that the company and subsidiaries earned net profits of \$2,779,831 after providing for interest, depreciation and other operating expenses.

The statement shows \$2,597,716 has been set aside to cover price allowance on cars, reserve against merchandise inventories, and extraordinary expense in connection with the company's gold note issue.

In 1921, after providing for expenses, interest and depreciation, the company reported a deficit of \$12,506,101 and, in addition, charged off \$11,054,288 for reduction in value of investments in affiliated companies, tool replacements and for additional provisions for loss of commitments, making the total deficit for 1921, \$23,560,389.

These figures make the 1922 statement all the more remarkable. The statement for 1922 shows assets of \$58,637,700, including \$29,509,327 of real estate and machinery holdings, \$1,314,976 investment in other companies, inventories amounting to \$24,171,209, miscellaneous notes of \$284,995, trust fund of \$47,770, notes and accounts receivable amounting to \$2,798,948, cash of \$272,054 and deferred charges of \$238,420.

that it will be difficult, if not impossible, to draw a good crowd. It has certain advantages, of course, but they seem to be far outweighed by the disadvantages, so far as I can see."

Both production and sales are going forward in a highly satisfactory manner and there is every indication, Willys says, of constantly increasing stability. March shipments mark the largest single month in the history of the company. Dealers are clamoring for cars, and about 350 driveaways are leaving the factory every day.

S. A. E. Arranging Cleveland Program

Announces Tentative List of Speakers for Transportation Meeting in April

NEW YORK, March 26—Spring activity among the various sections is reported by the Society of Automotive Engineers, which announced a schedule of meetings to be held in the near future. Chief of these is the get-together meeting of motor transport operators and members of the society to be held April 26 to 28 at the Hotel Winton, Cleveland. A tentative list of speakers is as follows:

F. C. Horner, consulting engineer, who will speak on the field for the motor truck in railway terminal cartage service.

S. G. Thompson and A. J. Scaife of the White Motor Co., who will make recommendations for the economic control of truck fleet operation.

S. von Ammon of the United States Bureau of Standards, who will present the results of exhaustive tests of truck rear axles for the Army Transport Corps.

Major Brainerd Taylor of the United States Motor Transport Corps, who will recommend methods of truck traffic control.

J. F. Murphy of the Columbia Terminals Co. of St. Louis, who will describe his organization and tell how it operates in the transfer of freight between nine railroad depots in St. Louis.

H. E. Flowers, chairman of the American Electric Railway Association's committee on motor bus and trackless trolley operation, who will discuss the co-ordination of street railway and bus transportation.

Paul H. Geyser of the Yellow Cab Manufacturing Co., Chicago, who will present recommendations on taxicab operation and maintenance.

Harold B. Wess, chairman of the Retail Merchants Delivery Association.

\$200,000 Fire Destroys C. G. Spring Forging Plant

DETROIT, March 23—Destruction of the forging plant of the C. G. Spring Co. at Kalamazoo by fire last week will restrict the operations of the company for about two weeks, by the end of which time it will be prepared to resume on a full schedule of operations. Arrangements had been made preliminary to the fire for the transfer of a large part of the forging work to Chelsea, Mich., and Detroit, and the capacity in those cities will be increased so as to take up all forging operations.

The plating plant and office building at Kalamazoo was not affected by the fire. Part of the plating plant will be turned over for forging work for the present. Besides its plating operations there the company is also doing this work in Detroit, Cleveland and Chicago. At Chelsea the company has taken over the plant of the Lewis Spring & Axle Co., which will be the main plant for forging fittings.

Executives of the company said that the forging plant would not be rebuilt

ENGINEERS SET DATE FOR TRACTOR MEETING

NEW YORK, March 26—The Society of Automotive Engineers has announced Thursday, April 19, as the date of its national tractor meeting, which will be held at the Auditorium Hotel, Chicago. This will precede an important meeting of the Farm Equipment Manufacturers Association. Two engineering sessions will be held, one in the morning and the other in the afternoon, with an informal luncheon during the noon period.

The feature of the morning session will be a paper by Prof. S. O. Sjogren of the University of Nebraska. It will be in the form of constructive criticism of an engineering nature as a result of extensive tractor tests conducted at the university of the State of Nebraska.

In the afternoon C. M. Eason, former vice-president of the Samson Tractor Co., will record the progress made in the development of the general-purpose type of tractor which is capable of doing all the work now done on the farm by horses.

The speaker at the luncheon will be a prominent agriculturist whose views on farm economics will be a diversion from the engineering talks of the morning and afternoon.

at Kalamazoo though it was intended to maintain operations there on a fixed scale because of the satisfactory labor market. By carrying on its plating and finishing operations in the large cities better market conditions are established. Loss incurred in the fire was about \$200,000.

Fire at Fabric Making Factory

The plant of the Detroit Waterproof Fabric Co. was destroyed by fire with a loss of about \$150,000 this week. The company was manufacturing top materials for Ford, Studebaker and for the replacement field. Ford Motor Co. had practically completed arrangements for taking over the plant at the time the fire occurred.

New York Gets Weekly Report of Sales Made

NEW YORK, March 26—Sherlock & Arnold, publisher of the Monthly Sales Analysis for the metropolitan district, has enlarged the scope of its work and is now issuing a Weekly Sales Analysis for the same territory.

The analysis gives a recapitulation of sales up to the week under review and at the same time goes into detail of the business transacted for that week.

For the week ending March 7, 1202 new cars were sold.

Porto Rican Future Bright, Says Peters

Good Prices Obtained for Crops Insure Enlarged Automotive Sales This Year

NEW YORK, March 23—An optimistic belief that considerable progress will be made this year in the automotive development of Porto Rico, was expressed here today by A. C. Peters, special representative of the Packard Motors Export Corp., who has just returned from a month's trip to the island.

His expectation of enlarging sales are based upon the present high prices for sugar which, if continued for any length of time, will mean a widespread return of prosperity. This crop represents about ninety per cent of the Porto Rican wealth. Peters stated that the growers of tobacco, coffee and fruits also were experiencing higher prices for their products and likewise were more prosperous.

Referring to dealer conditions, he said: After two years in which practically none of the automotive dealers made any money, they are now looking forward to good sales and better business. Some of the more important firms at San Juan have been reorganized in the expectation of pushing sales and little difficulty is to be encountered generally in regard to used cars or old stocks.

Railroads Inadequate

The automobile is an absolutely necessary vehicle for Porto Rico, as the railroads are inadequate. Good macadam roads have been built to nearly every section, and cars, trucks and buses run over these roads in great numbers.

Sales methods are much like those in the States, with some firms energetically developing business. The chief difficulty, as is the case in some other countries, is largely financial. The banks give little or no assistance to the dealers, who, therefore, must finance shipments and sales on their own accounts. Several good service stations are in operation, but they are handicapped to a certain extent by the number of small shops which handle maintenance work at low rates.

Representatives of several other large producing firms were at San Juan at the same time as was Peters, their presence being instrumental in the reorganization of the local firms. Truck sales, Peters found, were improving, but the extent of this recovery will be dependent upon the continuation of good prices and demand for sugar.

Peters will leave New York during April on an extended trip to Argentina, Uruguay and Brazil.

TAKES KING TRAILER PLANT

DETROIT, March 26—Ann Arbor Automatic Production Products Co. will take over the plant formerly occupied by the King Trailer Co., Ann Arbor, and will begin the manufacture of automobile parts about May 1. The new company is headed by J. J. Sinn, who has been head of a manufacturing company at Defiance, Ohio.

FINANCIAL NOTES

Electric Auto-Lite Co. has made a public offering through Tucker, Robison & Co., Toledo brokers, of a block of voting trust certificates representing the no par common stock of the company at \$60 a share. The offering has been largely over-subscribed. In the first six months of operation a third of the issue of \$3,000,000 of first mortgage bonds was retired. The earnings for 1922, after depreciation, bond interest and Federal taxes were in excess of \$2,646,900, or at the annual rate of more than \$13 a share for the 250,000 shares of common. Earnings of more than \$3,000,000 are predicted on the present output and contracts of the plant for 1923.

Martin-Parry Corp. reports a net income for the year 1922 of \$402,248, after charges and Federal income taxes. The amount is equivalent to \$4.02 a share earned on the 100,000 shares of no par value capital stock, compared to a net income of \$802, or 8 cents a share, in 1921. Net sales this year were \$4,327,685, compared with \$2,424,879 for 1921. Cost of operation jumped from \$2,360,169 in 1921 to \$3,881,911 in 1922. The surplus for the year 1922, after a \$200,000 dividend, was \$202,248, against a deficit of \$199,180 for the previous year.

Advance-Rumely Co.'s report for 1922 shows net profit from operations, after deductions, of \$137,610, which is equivalent to \$1.10 a share earned on the \$12,500,000 preferred stock, compared with a loss of \$1,964,216 in the preceding year. Gross profits amounted to \$1,804,979, as against \$1,353,452 in 1921.

Du Pont Motors, Inc., is offering through New York bond house an issue of 100,000 shares of no par value capital stock at \$8 a share, the proceeds of which will be used to develop the company's latest six cylinder model.

Moon Motor Car Co. has declared a regular quarterly dividend of 50 cents a share on its common stock. In the preceding quarter a regular dividend of 37½ cents a share and an extra disbursement of 12½ cents were paid.

Auburn Automobile Co. has declared the regular quarterly dividend of 1¼ per cent on preferred and \$1 per share on common of \$25 par, both payable April 1 to stock of record March 24.

Federal Motor Truck Co. has declared the regular quarterly dividend of twenty cents a share, payable April 1 to stock of record March 24.

Timken Expects This Year to Exceed Sales of Last

CANTON, OHIO, March 26—H. H. Timken, president of the Timken Roller Bearing Co., in his annual report to stockholders, announces that \$400,000 was spent for new machinery and equipment last year, in addition to large expenditures for renewals and replacements and the development of new manufacturing processes.

In his report he says:

We are adding to the steel mill and tube mill machinery and equipment to the value of over \$750,000, most of which is installed, which will enable us to sell a greatly increased quantity of these products; in fact, we have already contracted for the sale of this entire extra output.

This extra equipment also will enable us to reduce the cost of our steel and tubing for

our bearing requirements. The volume of our business during 1922 was materially in excess of any previous year, and from present indications our 1923 volume will exceed that of 1922.

As to the value of the Timken property, the report says that after ample reserves for depreciation charges and provisions for obsolescence, the plant account stands at \$6,015,671. An appraisal by the American Appraisal Co. as of June 30, 1922, however, showed the sound value to be \$11,595,308. An appraisal today, President Timken thinks, would show this value to be something over \$12,000,000. On the first of the year the company had 3295 stockholders.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

Larger demands for credit are a reflection of the continued growth in the volume of production. Prices for basic materials in general continue to advance. Commercial paper held the gain of the previous week and ranged from 5 to 5½ per cent. There has been continued activity in the stock market with total transactions running above 1,000,000 shares a day.

The Federal Reserve Board reports that the level of production has risen above the peak of 1920, and that stocks are being consumed as produced and are not accumulating. Consolidated statements from about 800 member banks of the Federal Reserve System show that loans increased faster than deposits since the first of the year, but the last weekly statement shows an opposite tendency.

Bradstreet's bank clearings for the week ending March 22 totaled \$7,644,005,000 as compared with \$7,149,897,000 the previous week and \$6,817,817,000 the same week a year ago. The volume of payments by check as reported by Federal Reserve member banks in 243 centers increased from \$9,354,530,000 to \$10,187,597,000 for the same week. In the similar week a year ago the total was \$8,987,497,000. These greater totals are explained in great measure by the fact that income tax installments were due March 15.

The volume of commercial activity as indicated by freight movement shows a slight weekly drop in car loadings from 917,896 to 905,219 in the week ending March 10. Both figures are records for this season of the year and about 100,000 cars a week above the similar period last year.

DOSS RUBBER REORGANIZED

ATLANTA, March 28—The Doss Rubber & Tube Co. has been reorganized and has started production at its plant here. Initial capacity on its new cord tire is 1500 tires and tubes daily, according to T. J. Davis, the new president of the company. A new board of directors has also been named and the appointment of A. W. Smith as production manager is announced.

Fords Are Included in Citroen Caravan

Coming to This Country for Demonstration of Creeper Band Mechanism

PARIS, March 22 (by mail)—In addition to three Citroen flexible creeper track automobiles fresh from the Sahara expedition, André Citroen, who is sailing from here on March 28 aboard the Olympic, will bring with him a four-passenger Ford, a one-ton Ford, and a high-speed Mors, all equipped with the Citroen-Kegresse system of rubber and canvas creeper band.

During his stay of one month in the United States, it is the intention of M. Citroen to give demonstrations of his machines under various conditions. The Ford has had its rear wheels removed and the creeper track mechanism substituted, the drive being obtained from a sprocket on the end of each of the differential shafts, and a pair of chains to a sprocket on the rear drums carrying the flexible band. The chain gives an additional gear reduction and allows the Ford to run at between 18 to 32 miles an hour.

Same Design With One-Ton

For the one-ton Ford the same general design has been followed, with a further gear reduction by means of the chains, the only differences being that the creeper band is broader and heavier, with a face width of 6 in. This track has a speed of 10 miles an hour, and with its creeper bands can operate just as successfully across country, in mud or sand, as over made roads.

The Mors seven-passenger car, equipped with a 30 hp. Knight-type engine, is the fastest creeper track machine ever built, for it can run at 35 miles an hour over ordinary roads or across normal country, while at the same time having the ability to climb any obstacle. The rubber and canvas band has a face width of 8¼ in. and is carried on pulleys of 25 in. diameter.

Special Axle in Mors.

While the engine and gearbox are the normal Mors type, the rear axle is quite special, for it contains a sliding gear with a couple of pinions, either of which can be brought in engagement with a pair of pinions on the bevel gear shaft. Both drives are indirect, but the arrangement gives two sets of gear ratios in combination with the four speed gearbox, or eight speeds ahead and two speeds on reverse.

The members of the Citroen party visiting America are André and Madame Citroen, Adolphe Kegresse, inventor of the flexible creeper band, Engineers Deloire, Dufresne, Julien and Ferracci, and Prudhomme and Rabaud, two of the drivers who accomplished the round trip by automobile from Paris to Timbuctoo.

Fleet Operators Use Own Service Depots

Majority Prefer Them to Public
Garages, Motor Transport
Survey Shows

DETROIT, March 28—An amazing volume of business is done annually in private service stations, according to figures presented by David Beecroft, directing editor of the Class Journal publications and general manager of *Motor Transport* magazine, at a luncheon here.

Before eighty manufacturers and advertising men, Beecroft presented figures as a result of investigations conducted among 15,000 private service stations in this country and abroad. The statistics were based on figures available from upward of 4000 replies to a questionnaire.

Probably the most outstanding fact disclosed by the investigation was that 85 per cent of fleet operators using more than three vehicles maintain their own service stations. These service stations carry a stock of parts, machine tool equipment and supplies to a degree varying with the number of vehicles operated.

Accompanying the figures on the number of private service stations were reasons as to why these were employed rather than public garages. The answers brought out the importance which fleet owners attach to the opportunity the private service station offers of keeping the vehicles running at all times.

Truck Organization Important

The entire research brought out very clearly the fact that the truck itself is only a tool and that the organization behind the truck is a far more important factor in the earning power of the transportation business than the truck itself. Another point, which was of considerable interest to those present, was the fact that the fundamental problems of transportation are the same regardless of the business in which the transportation unit is used, and regardless of whether passengers or freight is carried.

While the analysis as made so far does not give any definite figures as to the actual buying power of this hitherto unexplored section of the industry, it is sufficient to indicate that it far exceeds any casual estimate. When it is considered that more than 85 per cent of the fleet owners operate their own garages, and with fleets running as high as 4000 and more vehicles, an extraordinary market for machine tool equipment parts and supplies of all types is disclosed.

LIBERTY TIRE TO REORGANIZE

CAREY, OHIO, March 26—The bankruptcy case against the Liberty Tire Corp. is reported dismissed and the plant

has been placed in temporary state receivership until a reorganization can be effected. B. F. Wulff, vice-president and general manager of the Studebaker-Wulff Rubber Co., has been appointed receiver and it is stated that if satisfactory arrangements can be made with the creditors and stockholders, the factory may be merged with the Studebaker-Wulff company.

INDUSTRIAL NOTES

Kissel Motor Car Co., Hartford, Wis., has placed in commission a new steam generating plant representing an investment of \$150,000 and providing much needed additional capacity required for the operation of both the passenger car and motor truck divisions. The new plant was started last fall. It contains three 300-hp. boilers with an overload capacity of 600 hp. each and is equipped with automatic stokers and latest types of coal and ash handling machinery.

B. F. Sturtevant Co., Boston, has purchased for \$100,000 the entire plant of the defunct Wisconsin Engine Co. at Corliss, Wis., near Racine, and will establish a western production center employing from 500 to 600 men. Until recently the buildings have been used as a salvage storehouse by the Government. At the time of the bankruptcy in 1913 the plant was appraised at nearly \$1,000,000.

Hoosick Engineering Co., Inc., Hoosick Falls, N. Y., recently incorporated, is manufacturing a line of standard ignition parts and is also planning to bring out a number of automotive accessories. Forrest H. White is president, Ezra Tiffany, vice-president and Salem H. White, secretary and treasurer.

Motor Products Corp. plans to spend \$1,000,000 for additional buildings and equipment for the Detroit plant, the increased facilities being made necessary by increased business, according to D. B. Lee, president.

Stoughton Wagon Plant Operating at Capacity

STOUGHTON, WIS., March 26—The demand for motor truck chassis and completed vehicles made by the Stoughton Wagon Co. of Stoughton, Wis., is so heavy that the maximum capacity of the plant has been reached and plans are being made for extensions.

The company makes a wide range of vehicles, specializing in heavy-duty trucks for hauling milk and cream, specialized highway construction equipment, passenger buses, etc. Most of the capacity formerly devoted to the farm wagon industry is now employed for motor vehicle construction.

MILLER PLANT ADDITION

AKRON, March 28—The Miller Rubber Co. will build a new \$325,000 addition to its factories in South Akron. The addition will be four stories high and will permit needed expansion of tire building departments. The company is now producing tires at the rate of 8500 a day which is above the present normal capacity.

METAL MARKETS

The novelty has worn off the theme of high and rising steel prices and, as is usual amid such conditions, some of the more adventurous spirits are now trying to beat one another to it with predictions of a change in the market's form. With basic conditions and the demand intensifying, hour-by-hour, the neck-of-the-bottle state of affairs in the steel industry, predictions of early relief sound quixotic; nevertheless, such prophecies are now beginning to multiply. It should be emphasized that none of these emanates from either steel producers or consumers. One fathered by an economist, and based on the cycle theory, forecasts a downward swing in the pig iron market "within the April-August period."

It is quite possible that pig iron prices may ease off within the next two or three months. Production is relatively heavy today, and after the second quarter demand has been satisfied and, if third quarter demand is not too insistent, an easier tendency would not be at all surprising. Such a condition in the pig iron market, however, would have no more effect on steel prices than would a break in the Japanese silk market. Time and again the steel market has been the scene of uninterrupted activity and prosperity, while that for pig iron was in the doldrums. All steel producers who exert the least influence on the market are self-contained in the matter of their pig iron supply and, while the price of iron ore, limestone and blast furnace labor is one of the factors in the making of steel prices, the market for pig iron, which is made by the supply and demand for merchant iron, is of pertinent interest to the steel industry only on those occasions when it pays steel mills better to sell their blast furnace output as pig iron than to convert it into steel.

So far the steel market still shows as the line of least resistance that tending in an upward direction. When a change does come it will in no wise be associated with conditions in the pig iron market. In fact, the very first sign of an easing off in the automotive demand for steel will have a hundred-fold more effect on the market than would any price movement in the pig iron market, no matter how extreme. The outstanding factors that will influence steel prices over the next few months appear to be (1) increase or lessening of the demand (and in this the automotive industries are certain to play the rôle of the bell-wether); (2) the cost of labor (advances in wage scales are scheduled throughout the steel industry); (3) general economic conditions.

Pig Iron.—The market is firm on a \$31@ \$31.50, Valley basis, with some second quarter buying for account of automotive foundries, and inquiries for third quarter prices from the same source.

Aluminum.—A year ago a census of aluminum held in the "outside" market would have revealed tonnages that would have sufficed to put consumers at ease with reference to their supply for several years. Today the aluminum market presents an appearance resembling that for "Piggly Wiggly" shares on the Stock Exchange a week ago. Holders of what limited spot stocks there are prefer to bide their time. Importers are not quoting.

Copper.—Wrought copper and brass products manufacturers are beginning to feel uneasy lest too sharp advances in the copper market make it necessary to raise their prices to levels that would cause a slowing up in third quarter orders.

Calendar

SHOWS

- May 13-20—New York, Spring Salon, Hotel Commodore.
Nov. 4-10—New York, First Automobile Exposition of the Foreign Automotive Association, Hotel Astor.

FOREIGN SHOWS

- March 31-April 29—Madrid, Spain, International Automobile Exposition at the Palacio de Exposiciones, showing automobiles, motorcycles, accessories and equipment, under the auspices of the Chambre Syndicale de l'Automobile et du Cycle.
May 9-June 12—Gothenburg, Sweden, International Automobile Exhibition, Sponsored by the Royal Automobile Club of Sweden.
Oct. 4-14—Paris, Passenger Cars, Bicycles, Motorcycles and Accessories, Grand Palais.
Oct. 24-Nov. 2—Paris, Trucks, Agricultural Tractors, etc., Grand Palais.

RACES

- May 10—Berlin—Grunewald, German Grand Prix.

- May 30—Indianapolis, Eleventh Annual 500-mile International Sweepstakes.
July 2—Tours, French Grand Prix 500-mile race.

CONVENTIONS

- May 2, 3, 4—New Orleans, Annual Convention of the National Foreign Trade Council.
May 7-10—New York, Annual Convention of the United States Chamber of Commerce.
May 7-12—Seville, Spain, Fourth International Highway Congress.
Oct. 24-26—Cleveland, Thirtieth Annual Convention of the National Association of Farm Equipment Manufacturers, Hotel Statler.

S. A. E. MEETINGS

Metropolitan Section

- April 19—Speaker, Edw. E. La Shum, General Superintendent, Motor Vehicle Equipment, American Railway Express Co.; Subject, Engineering Features of Fleet Operation.
May 17—Speaker, F. P. Gilligan, Secretary, Henry Souther

Engineering Co., Subject, Metallic Materials for Automotive Work.

Other S. A. E. Meetings

- April 6—Washington Section—Some Observations on Exhaust Valves—A. W. S. Harrington—8 p.m.—Cosmos Club Lecture Hall.
April 6—Detroit Section—A Process of Gear Grinding and a Discussion of Tooth Forms—Glenn Muffy—8 p.m.—General Motors Building—Supper 6:30.
April 10—Cleveland Section—Psychology of Paint—Edward S. Jordan—8 p.m.—Rooms of the Cleveland Engineering Society, Hotel Winton—Visit to Sherwin-Williams Plant in Afternoon.
April 13—Buffalo Section—Electricity in the Motor Vehicle—C. F. Bishop—8 p.m., Hotel Iroquois.
April 19—National Tractor Meeting—Prof. S. O. Sjogren and C. M. Eason—Auditorium Hotel, Chicago.
April 20—Mid-West Section—General Design of Electric Trucks and Their Performance in Urban Work—J.

- G. Carroll—7 p.m.—Western Society of Engineers.
April 26-28—Automotive Transportation Meeting of the S. A. E. to be held at the Hotel Winton, Cleveland. Sessions will be devoted to truck, motor bus, taxicab and motor rail car transportation, featuring operation rather than design.
April—New England Section—Chassis Lubrication—C. A. Bacon—8 p.m.—Engineers Club, Boston.
June 19-23—Summer Meeting of the S. A. E.—Spring Lake, N. J.
Oct. 25-26—Production Meeting of the S. A. E.—Cleveland.
Jan. 1924—Annual Meeting of the S. A. E.—Detroit.

MEETINGS

- June 14-15—Bethlehem, Pa., Eastern Sectional Meeting of the American Society for Steel Treating, Hotel Reservations made through George C. Lilly, Superintendent of Heat Treatment, Bethlehem Steel Co., Bethlehem.
June 25-July 1—Dixville Notch, N. H., Summer Meeting of the Automotive Equipment Association.

Service Big Element, Equipment Men Told

DETROIT, March 24—B. G. Koether, director of sales and service of the General Motors advisory staff, addressed the March meeting of Service Equipment Associates, held in this city, on the importance of constantly improved service methods to the automotive industry. Representatives of the sixteen companies comprising the associates attended.

"In common with the entire industry," Koether said, "General Motors is interested in anything that may contribute toward improving service to the car owner as it is only through such a course that we may increase public good will and widen markets."

He then went on to say:

As a product obtains wide distribution the prospective purchaser becomes more or less immune to advertising and sales activity and more and more under the influence of friends who have had experience with the product in question.

This intercourse between car owner and prospective buyer has become one of our most direct sales influences. It would be hard indeed to find a prospect who hasn't a friend who owns any standard automobile you might name. When a man considers purchasing an automobile nowadays, he will invariably consult those of his friends who own or have owned the car in which he is interested, and whether a product receives an indorsement or a condemnation will depend largely upon the efficiency of the service that has been and is being rendered.

It has required time, effort and money to develop the automobile mechanically, but for a number of years the servicing of cars in user's hands, as a specific subject, did not receive adequate consideration.

The service problem has grown bigger and bigger each year until today, for every new

car sold, there are five cars in the market for service. It is but natural, therefore, that service should be uppermost in the mind of the industry.

The problem is not a simple one—its solution will require the best brains of the industry.

Satisfactory service is closely analogous to standardized service.

Among the speakers were David Beechcroft, directing editor of the Class Journal Co.; Clyde Jennings, editor of Motor Age, and E. M. Young and Frank G. Eastman of the General Motors advisory staff.

Fiat to Build 200 Cars Daily in Its New Plant

ROME, ITALY, March 15 (by mail)—Officials of the Fiat Co. expect to have a capacity of 200 cars daily or close to 60,000 annually when the new Linghotto plant is in full operation. The equipment has not yet been completely removed from the old shops.

The new factory consists of a large single building 600 meters long and approximately 100 meters wide. It has two wings, each five stories high, with the floors in the separate wings connected by sheltered bridges. It is proposed to assemble the chassis on the first four floors of the east wing. The west wing will be given over to the construction of bodies and their painting and finishing.

The bodies will be placed on the chassis and cars completed on the fifth floor of the east wing. Large storerooms are provided on the main floor. An innovation of the plant is the testing track which is banked at either end and is located on the roof.

Approximately 30 per cent of the Fiat chassis are sold without bodies.

Belgium Completes New Tariff Schedule

PARIS, March 17 (by mail)—An import duty of 640 francs per hundred kilos on passenger cars and trucks of less than 2 tons weight, of 480 francs per hundred kilos for trucks of more than 2 tons weight, and 240 francs per hundred kilos for trucks of more than 4 tons weight, are the principal features of the new Belgian tariff law with which it is proposed to replace the present 20 per cent ad valorem import duty.

The projected law has not yet been distributed to the Deputies and consequently has not come up for discussion. It was stipulated that on German goods the duty shall be doubled.

So far as France is concerned, there is a likelihood of a separate commercial agreement satisfactory to the automobile industry of both nations. Count de Liedekerke and Germanes, representing Metallurgique; Galopin, representing F. N., and De Jong, representing Minerva, have paid three visits to Paris to discuss a reciprocal tariff with Louis Renault, Robert Peugeot, and Baron Petiet.

The decisions have not been made public, but are considered satisfactory to both parties. The Belgian Government is willing to admit similar agreements with other nations.

INSTALLMENTS BUY INSURANCE

NEW YORK, March 26—Buying automobile insurance on the installment plan is an innovation introduced by a New York mutual automobile casualty insurance company. This insurance can be had on monthly installments and without interest.